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WITH

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TRANSACTIONS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

THE AGRICULTURE OF THE COUNTIES OF ELGIN AND NAIRN.

By Alexander Macdonald, Sub-Editor, *North British Agriculturist*, Edinburgh.

[*Premium—Thirty Sovereigns.*]

Introductory.

The counties of Moray and Nairn, if among the smaller in Scotland, have long occupied a front place agriculturally. To say nothing at this stage of the dryness of the climate on the plains of Morayshire, of the richness of the landscape, especially in the Forres district, or of the kindliness of soil over the greater part of both counties, there are certain branches of rural industry in which Moray men have latterly elevated themselves and their county to a very distinguished position. The superiority of the Moray and Nairn barley, and often also wheat and potatoes, have long been topics of favourable comment among agriculturists and traders. In these respects the combined counties occupy the first place north of the Grampians, if not north of the Tay.

Much more celebrity still has been acquired for Moray in the department of cattle rearing and feeding, particularly from the great English Christmas fat shows. No fewer than three times during the last sixteen years has the great prize of the year for fat stock—the championship at Smithfield—gone to Morayshire, —to Earnhill in 1866, to Burnside in 1872, and to Altyre in 1881. No other Scotch or even English county has accomplished such a feat. Moray and Nairn have had their full share of

other showyard honours, chiefly for cattle, and have also reared many pedigree animals, as well as fattened a large number of the primest beeves, annually for the great southern markets.

These two counties combined form the north-eastern and larger portion of the ancient province of Moray, which, roughly speaking, extends from Banffshire in the east to Ross-shire in the west, and from Perth in the south to the Moray Firth in the north. Morayshire is by far the larger of the two, and also the more important, from an agricultural point of view. It extends from north to south 40 miles, and from east to west 20; has an area of 531 square miles, or, according to the Ordnance Survey, 312,378 imperial acres, including lakes, rivers, and foreshores. In size it ranks eighteenth among Scotch counties, and constitutes $\frac{1}{64}$th part of the entire area of Scotland.

This county is bounded on the east by Banffshire, from which it is partly separated by the river Spey, on the south by the upper or hilly districts of Inverness-shire, and on the west by the county of Nairn, while on the north it is washed by the German Ocean. The eastern extremity is in 57° 39′ N. lat. and in 3° 7′ W. long.; the western extremity in 57° 17′ N. lat. and in 3° 45′ W. long.; the most southern point in 57° 17′ N. lat. and 3° 39′ W. long.; and the extreme northern part of the county in 57° 43′ N. lat. and 3° 16′ W. long. Towards the centre of the county the N. lat. is about 57° 39′, and W. long. about 3° 16′.

It is stated in the Agricultural Returns of 1881, that the total area of the county is 340,000 acres; and the returns of owners of lands and heritages, drawn up in 1872–73, gives an estimate of 303,168 acres as the property of 2564 owners, 2313 of whom are proprietors of lands less than 1 acre in extent. The gross annual value of the total acreage of property is given as £203,705. Those who possess less than 1 acre have 432 acres in all, while the owners of 1 acre and upwards claim 302,736 acres.

Nairnshire is bounded on the east by Morayshire, on the south and west by Inverness-shire, and on the north by the Moray Firth. Its greatest length is about 22 miles, its greatest breadth about 15 miles; and according to the Agricultural Returns for 1881, its total area is 137,500 imperial acres, including inland waters and foreshores. The gross annual value, according to the Valuation Roll for 1881, is £34,284, 19s. 3d. The most eastern point is in N. lat. 57° 38′, and in W. long. 3° 45′; the extreme western point in N. lat. 57° 36′, and in W. long. 3° 45′; the point extending furthest southwards—known as Carn Alt Laigh Stone, where the counties of Inverness, Moray, and Nairn all join—in 57° 22′ N. lat. and in 3° 48′ W. long.; the most northern point in N. lat. 57° 38′, and W. long. 3° 51′. This county ranks twenty-ninth among Scotch counties,

and makes up about $\frac{1}{141}$ part of the surface of Scotland. There are several detached portions of Nairnshire lying within the boundaries of Morayshire. The largest of these sections has an area of about 43½ acres, of which about 14 acres is covered by water.

In 1873 there were 537 owners of land, whose property was 120,765 acres, and estimated at £41,767 gross annual value. Seventy owners possess each 1 acre of land and upwards, having amongst them a total of 120,636 acres. The other 467 proprietors hold lands less than 1 acre in extent, and measuring in all only 129 acres, or on an average less than one-third of an acre each. Morayshire contains twenty-two parishes, but six of these are only partly within its boundaries. Of these six parishes, which lie partly beyond the limits of this county, five stretch for a considerable distance into Banffshire; while Dyke and Moy, which are usually regarded as one parish, extend into the adjacent county of Nairn on the west. There are only two royal burghs in the county, viz., Elgin and Forres, although there are many villages of considerable importance. The royal burgh, or city of Elgin, as it is frequently called, from the fact that it has been the residence of a bishop, with a cathedral in it, is pleasantly situated on the bank of the river Lossie, which in passing Elgin runs through a beautiful sylvan valley. At an early period the town seems to have stood further to the west, at or behind what is now the site of the Infirmary and Lunatic Asylum. Originally the town consisted of huts surrounding Lady Hill, a mound at the west end of the town, about 100 feet high, surmounted by a tall monument to the last Duke of Gordon. Lady Hill was named from a church which was dedicated to the Virgin Mary, and which once stood on the top of it. There are now the ruins of a castle upon the summit of this mound, which had been built of run lime, and the foundation of which can still be traced, showing that it occupied the whole top of the hill. When it was built it is impossible to say. It was held successively by the Douglases, Dunbars, and also the Lairds of Darnaway, who received certain customs from the burgesses of the town. Kings of Scotland sometimes lived in the castle of Elgin, as was the case with Malcolm III., but the building has been in ruins for about 400 years. The town of Elgin is supposed to have derived its name from Helgy, a Norwegian general, for upon the town seal "S. Commune Civitatis D. Helgyn" was engraved in Saxon characters, supposed to have been done about the middle of the sixteenth century. The cathedral, the principal feature of historical and architectural interest in Elgin, was one of the most magnificent in Scotland. It was founded in 1224, and the bishop removed from his residence at Spynie to Elgin at that period. The ruins of the cathedral,

which are very majestic, and which many go far to see, are the most massive of any of the kind in Scotland. It was burned in the year 1390 by Robert Stewart, Earl of Buchan, and Lord of Badenoch, known as the "Wolf of Badenoch."

In the eighteenth century there was a good deal of manufacturing in Elgin. There were many hand-weavers in the town, but the power-loom has superseded all these. There are two woollen manufactories at present in the town, one at Newmill and the other in Bishopmill. Besides these factories, there is an extensive tan-work, which has been in operation for more than half a century. Elgin is the county town of Morayshire, and the returning burgh for the member of Parliament elected by Elgin, Banff, Cullen, Inverurie, Kintore, and Peterhead. The parliamentary constituency in 1881 was 930. In short, Elgin may be called a fashionable little city; many retired naval and military officers, and business men, have been attracted to it by its pleasant situation and mild climate. The population of Elgin in 1881 was 7413, 3257 males and 4156 females. The number of separate families is 1816, and the number of inhabited houses 1465, while there are about 40 houses vacant and about 20 building. During the past half century the population has been slowly increasing, but not very materially. The town derives considerable importance from the fact that, so to speak, it is the metropolis of a large rural district.

It appears that the erection of the sheriffdom of Moray took place in the reign of James II., and, although Sir Alexander Dunbar of Westfield was deprived of the earldom of the county in the minority of James II., because he was accounted an illegitimate son of John Dunbar, he was in 1450 made heritable sheriff, whose jurisdiction extended over the whole of the province of Moray. About this period, or perhaps a little earlier, the county of Inverness was much more intimately connected, socially and commercially, with the north-eastern portion of the province of Moray than it had been since the first of the fifteenth century down to the retirement of Sheriff Bell in 1882, when the counties of Elgin and Nairn were again put under the sheriff of Inverness instead of the sheriff of Banff as they had been for many years. A sheriff-substitute resides at Elgin, who holds sittings alternately at Elgin, Nairn, Grantown, and Rothes; while Sheriff Ivory, under whose jurisdiction are the counties of Inverness, Moray, and Nairn, resides in Edinburgh. For a number of years, or rather centuries, Elgin has been the seat of presbyteries, law, and county courts. The gross annual revenue of the burgh in 1880–81 was £30,297, 18s. 6d., while the railway valuation amounted to £781.

The other royal burgh in Morayshire is Forres, which is

pleasantly situated about 12 miles to the west of Elgin. It was created a royal burgh by William the Lion. The town, though small, is clean and attractive, the locality being as famous for its scenic loveliness as for its historic interest. In its suburbs the soil is very rich and well sheltered, which, combined with warm climate, specially adapts it for garden purposes. There is also a nursery of no little importance in its neighbourhood. According to tradition, Forres was also burned by the "Wolf of Badenoch" in 1390, in consequence of a feud with the Bishop of Moray. The ancient charters of the burgh having been thus burned, a new one was granted by James IV. in 1496. The last census returns gives the population of the burgh of Forres as 4030, 2257 females and 1773 males. The number of separate families is 1036, inhabited houses 845, vacant houses 40, and 8 houses building. The principal public works, at which a good number of the inhabitants are employed, are manure manufactory, iron works, woollen factory, brewery, flour and saw mills, and coach works. The most striking object of interest to the casual observer is an immense obelisk 23 feet in height, most beautifully and richly sculptured, and prominently placed on an elevated piece of ground on the south-east of the town. It is known as "Swenos Stone," and is said to have beeen erected to commemorate a defeat of the Danes. On the south-east of the burgh is Cluny Hill, on which there is a beautiful plantation and many delightful walks. From the top of this hill a fine view can be had of a long stretch of cultivated land, and beautifully laid off farms, lying between Forres and the Moray Firth. Among other objects of interest is the Forres hydropathic establishment, which is situated on the south side of Cluny Hill, and which is as useful as it is ornamental. On the top of Cluny Hill there is a tower erected in honour of Nelson's victory at Trafalgar. The total revenue of Forres for 1881 was about £1714, 16s. 3d. Along with Inverness, Nairn, and Fortrose, Forres has a representative in the House of Commons. The sitting member for these burghs is Mr C. Fraser-Mackintosh, while Mr Alexander Asher is member of Parliament for the Elgin group of burghs. The constituency of Forres in 1881 numbered 408.

As I have already indicated, there are a large number of villages in Morayshire. The principal of these are Lossiemouth, Branderburgh, and Stotfield, which together have a population of 3497; Burghead 1428, Rothes 1382, Grantown 1374, Hopeman 1323, and Garmouth and Kingston 952, &c. The total valuation of Morayshire in 1881–1882, including railways, exclusive of the royal burghs of Elgin and Forres, was £183,660 and the rural parliamentary constituency was 1617. Nairn, the only royal burgh in the county of Nairn, has a population of 4161, 1867 males and 2294 females. It will be observed that

there are 427 more females than males, but it may be mentioned that this is by no means a rare occurrence in the north of Scotland. Of separate families there are 1034, inhabited houses 822, vacant houses 38, and 12 houses building. The town lies on the west bank of the river Nairn, close on the shore of the Moray Firth, and is 22 miles west of Elgin and 15 miles east of Inverness. Its distance by rail from Edinburgh is 199 miles. It is a popular bathing resort, being beautifully situated, well exposed, and in every way convenient, tidy, and healthy, while the climate is mild and warm. Numerous charters were conferred upon Nairn many centuries ago, but all were lost except one granted by King James I., which is still held by the town. This charter tells how the ancient deeds and infeffments of the burgh had been "destroyed and lost through (the) turbulences, occasion of war, and divers depredations and incursions of Irish rebels, and through the negligence of the custodiers." Up to a comparatively recent date, Nairn was the boundary line between the Saxon and the Gael, both languages having been spoken in it. It was the boast of King James that he had "a toune in Auld Scotland, the toune of Nairn, which was so large that the folk at the one end did not understand the language spoken at the other end." There are no manufactories in Nairn, but a considerable fishery trade is carried on. The harbour some years ago was the main source of income, but the railway, which is in close proximity to the town, has militated against harbour profits for the past few years. The streets, as a rule, are somewhat irregular, which may be ascribed to the antiquity of the town. In the building and laying out of new residences, however, modern improvements have been introduced. The inhabitants are well provided with educational institutions. The revenue of the town in 1881 was £13,216, and in 1858, £3096, which shows an increase of £10,120. The parliamentary constituency in 1881 was 387, and in 1858, 116. In this county, as well as in Morayshire, there are a few small towns or villages, chief among which is Auldearn, which has a population of 363. The total valuation of the Highland Railway Company in Nairnshire was £1932 in 1881–82.

The scenery, especially in the lower districts of Moray, presents much natural beauty. There is a good proportion of the total area under woods, which are beautifully dotted over the county. The large extent of arable land is well sheltered generally, but there are also some wide stretches of barren moor. The main range of hills extends nearly the whole length of the county, from east to west, running nearly parallel with the Moray Firth, and at an average distance of from 6 to 12 miles inland from it. This range is not of great height, but is sufficient to form a substantial division between the upland and

the lowland districts. The lower part is known as the "Laigh of Moray," and is said to be one of the finest agricultural districts in the kingdom. It is about 30 miles in length, and from 5 to 12 miles in breadth. It is extremely well sheltered from southern, south-eastern, and south-western tempests by the Dallas hills, Black hills, Mannoch hills, Brown muir, Heldon hill, Tulloch hill, Burgie hill, and Knock of Alves, which chiefly comprise the range just mentioned. The highest peak in Morayshire is Carnan-Lion, which is 1797 feet. The upper or Strathspey division of the county differs in contour and also in soil from the "Laigh of Moray." It is of course much higher, and is more irregular in surface, but in many parts the soil is almost as fertile as in the lower districts. Along the valley of the Spey, there are some charming little straths, displaying much natural beauty. The county ranks well with sportsmen. There are no deer forests in it, but the moors carry heavy stocks of grouse and hares; while in the lower grounds good bags are to be got of snipe, partridges, and pheasants, and also rabbits and hares, but especially the former. On some small hills in the "Laigh of Moray" there are a few grouse to be seen occasionally. The chief home of these birds in the county is the chain of hills which I have already described. Of the two natural divisions of the county, the maritime one stands highest, from an agricultural point of view. The land here is of an undulating character in the east, and is almost a dead level in the middle and in the west. In the more inland districts the elevation of the land is steep, with a south or south-east exposure. There is very little level land on the south side of the Mannoch hills. The geological features in Morayshire are of great variety. There are four sandstone ridges, viz., Covesea Hill, 288 feet in height; Quarrywood Hill, 280 feet; Pluscarden Hill, 776 feet; and the hills of Dallas, 850 feet. The hills further south consist of granite, mica, slate, quartz, gneiss, schist, &c. In the "Laigh of Moray," sandstone of the old red formation, limestone and yellow or grey sandstone prevail, while gneiss and granite abound principally in the upper districts.

The finest and most extensive lake in the county is Loch-an-dorb, in the parish of Inverallan, and about 9 miles from the village of Grantown. It is fully 2 miles long and 1 mile broad, and is famous for its trout. In the centre of this beautiful lake are ruins of a stronghold, once in possession of the "Wolf of Badenoch." The Loch-an-dorb trout weigh on an average, from ¼ lb. to ½ lb., and they are of excellent quality. Loch Blair, in the parish of Forres, is 30 acres in extent, and contains good trout, varying from ¼ lb. to ¾ lb. Loch Lossie, in the parish of Dallas, is a mile long and a quarter of a mile broad. The trout caught in it run from ½ lb. to 6 lbs. Loch-an-Tore is also in

the parish of Dallas. Loch-na-bo, in the parish of Urquhart, is one mile long by a quarter of a mile broad, and is celebrated for the beauty of its scenery, and the quality and abundance of its trout, which weigh from ½ lb. to 12 lbs. There are a few other small sheets of water in the county. To the north of Elgin is Loch Spynie, the property of Captain Dunbar Brander. It is not a large sheet of water, but affords good sport to the angler. The more important rivers which flow through the county rise from 40 to 70 miles south of the city of Elgin, and fall into the Moray Firth. The Lossie, which passes through one of the richest and most picturesque parts of the "Laigh of Moray," has its source in Loch Lossie, and runs a serpentine course of about 25 miles, falling into the sea at the village of Lossiemouth. From its source to its mouth it has a very gradual fall. It is an excellent trout fishing river, and contains a few salmon, sea-trout, yellow trout, and "finnochs." Its chief tributaries are the Lochry and Lenoch burns, which are also famous for good trout fishing. The fishing in the Lossie belongs to the Earl of Moray, but has been let on a lease of 100 years to the Dunbars of Pitgaveny. Captain Dunbar is proprietor of part of the salmon fishings at the mouth of the river. The rod season begins on February 11 and ends in October.

The river Findhorn rises between Strahdearn and Stratherrick, and runs a very rapid course of from 60 to 70 miles. Its chief tributaries are the Moy, the Bruach, the Pallan-shoch, the Divie, the Dorbach, and the Muckle Burn. These, as well as the Findhorn itself, are excellent trout streams. Salmon angling during the months of March, May, June, and September is excellent; while in July, August, and September plenty of good trout are got. Skilful anglers can make a good basket of trout during a fine day in the month of July. Without the consent of the proprietors, anglers are strictly prohibited from fishing in any part of the river. Apart from the excellent fishing that is to be had here, the scenery is in itself exceedingly attractive. It has been said, that along the grounds of Darnaway and Altyre, the character of the woodland scenery is the "choicest for the artist's pencil" that could be desired. On the extreme opposite side of the county runs the majestic Spey, which for volume of water and extent of basin drained by it, is the second river in Scotland. It rises about 6 miles from Loch Laggan, flows through Loch Spey, falls into the sea at Garmouth, and is in all about 100 miles long. It runs for over 30 miles through Inverness-shire, and receives on its left bank the Marky and the Calder, and some other smaller streams, and on the right bank the Truim, the Tromie, the Feshie, &c. For a considerable distance, it passes through Moray and Banff shires, while different sections of the river form the line of separation between

these two counties. Its course from its source to the sea is very rapid. Its chief tributaries after it enters the county of Moray are the Dulnain, Nethy, Aven, and Fiddoch. The river is open to the public for trout fishing, and good sport is generally obtained. It may be mentioned here that the Spey during the past few centuries has deposited much fine alluvial soil, which I shall subsequently describe. The best salmon fishing is preserved by proprietors, or let to shooting tenants. The weight of the salmon varies from 8 lbs. to 30 lbs., while that of trout is from ¼ lb. to 1 lb. The best months for salmon and trout fishing are the same as those on Findhorn. In 1860, the course of the river at its mouth was moved about three-fourths of a mile westward from the old channel, for the purpose of benefiting the salmon fishings and protecting the village of Kingston, on which the current had been encroaching.

The capes and bays in Morayshire are the Spey Bay, Stotfield Point, Covesea Point, Burghead Bay, and the estuary of the Findhorn.

The configuration of Nairnshire, in so far as features of scenery are concerned, is similar to that of Morayshire. The surface of the greater part of the county is a continuation of the long fertile plain known as the "Laigh of Moray," but it is somewhat more undulating in its character. The soil is neither so equal nor so heavy. There is a good deal of wood over the county. The range of hills, which extends through the centre of Nairnshire from east to west, is an extension of that which traverses part of the county of Moray. None of the hills in this range exceed 1600 feet in height. The scenery in the hilly districts is bleak and uninteresting. There are large tracts of sterile heath, moss, and mountain land, which certainly do not present a varied or pleasing aspect. The valley of the Findhorn and the lower parts of the county, however, are exceptionally picturesque. Along the banks of the Findhorn there are large patches of rich alluvial land, which is skilfully cultivated.

The geological features of the county have a striking similarity to those of Morayshire. The prevailing strata are gneiss, old red sandstone, grey sandstone, and quartz rock. The belts of wood which are so profusedly scattered over the county consist of birch, fir, hazel, alder, and ash. Good shooting is usually obtained, hares, partridges, grouse, snipe, and pheasants being abundant. Towards the west of Nairnshire there is much natural beauty to attract the eye of the visitor. One of the most interesting objects of antiquity is Cawdor Castle, which was licensed to be erected by James II. in 1454. It nestles snugly in a thicket of wood, and nothing but its numerous turrets is to be seen until the visitor approaches quite close to it. Its surroundings are exquisitely beautiful. There are several other

ancient castellated buildings in the county. In short, Nairnshire has been described as diversified with rich corn fields, fine pleasure grounds, woods and forests, farm houses, mansions, castles, villages, and towns.

The lochs in Nairnshire are neither extensive nor important in their stock of fish. The principal sheets of water are Cranloch, Lochlee, and Loch of the Clans. The rivers are, with one or two exceptions, small. The Findhorn, which runs for about 15 miles through the eastern side of the county, I have already described as one of the Morayshire rivers. It may be mentioned that the Findhorn passes through the county of Moray for a distance of 12 miles. The river Nairn rises in the Monadhliadh hills, and after a run of 36 miles, falls into the Moray Firth at the town of Nairn. Its course is devious, and there is much romantic scenery along its banks. It is an excellent spawning river, and salmon and trout are numerous at certain seasons of the year. Good baskets of trout are generally obtained in the summer months. The Cawdor burn is the chief tributary of the Nairn. It rises among the Cawdor hills, and affords fair sport in trout. All respectable anglers are allowed to fish in the Nairn and its tributaries, on application to the proprietors, chief of whom are Major Rose of Kilravock, Mr Davidson of Cantray and Mr Forbes of Culloden.

As regards communication with the outer world, these two counties are exceptionally well supplied. By sea, as well as by land, the inhabitants have long enjoyed the privilege of access to all parts of the world. The principal shipping harbour is at Lossiemouth, from which a great deal of grain and potatoes is exported, and large quantities of coal imported. There are other harbours of less importance in these counties, of which Burghead and Nairn are the most considerable. Than Morayshire, few counties in the north of Scotland have been intersected to a greater extent by railways since 1850. Nairnshire has also sufficient outlet for the product of farmers and tradesmen. The main lines which traverse Morayshire are those of the Highland and Great North of Scotland Railway Companies, while the only line in Nairnshire is that of the Highland Railway Company. There was at one time railway communication between Kinloss station, on the main line, and Findhorn, but it has been dropped for some years, in consequence of the unimportance of the town and the traffic therefrom. The inhabitants of Burghead have enjoyed the advantage of railway communication since 1862, when a branch of the Highland Railway from Alves station was opened. The line from Elgin to Lossiemouth, 6 miles in length, and opened in 1852, was the first line made north of Aberdeen. The two companies' lines may be said to divide Morayshire into four divisions, the Highland Railway

running in a direct line through the centre from east to west, and the Great North from north to south-east through the glen of Rothes, crossing the Spey by a well-constructed viaduct, and on past Craigellachie. From the main line at Craigellachie the Strathspey section of the railway extends to Boat of Garten, a distance of 33¼ miles, where it forms a connection with the Highland line.

The extent of land under woods in both counties is large. In Morayshire there were 45,368 acres in 1871, and 50,130 in 1881, which shows an increase of 4762 acres during the last decade. In 1871 there were 14,349 acres under woods in Nairnshire, and in 1881, 13,241, which shows a decrease of 1108 acres. Last year there were 26 acres under grass lands and fruit trees in Morayshire, one acre used as market gardens for the growth of vegetables, &c., and 93 acres used by nurserymen. In Nairnshire there were 12 acres under grass lands and fruit trees, and 3 acres used by nurserymen.

Population.

The following table shows the population of both counties since 1801 :—

	Moray.	Nairn.
1801, ...	27,760	8,322
1811, ...	27,967	8,496
1821, ...	31,398	9,268
1831, ...	34,498	9,354
1841, ...	35,012	9,217
1851, ...	38,959	9,956
1861, ...	43,322	10,065
1871, ...	43,612	10,225
1881, ...	43,760	10,454
Increase in Moray since 1801, . .	16,000	
„ Nairn „ 1801, . .	2,132	

It will be observed that, excepting a slight decrease in the case of Nairnshire during the decade of 1831–41, the respective populations of these counties have been gradually increasing since the first of the present century. Between 1851 and 1861 there was an increase of 4363 in Morayshire, being more than at any decimal period since 1801. For the past twenty years the increase in both counties has been insignificant, there being a diminution in a great many rural districts since 1871. Burgh populations, as a rule, have been growing much more rapidly than rural ones during the past ten years. In regard to population, Morayshire stands seventeenth in Scotland, which it also did in 1801, and Nairnshire stands thirty-second. In the former county there are nearly 7¼ acres to each inhabitant, while in the latter there are about 11½ acres to each person. In 1881 there were 20,700 males and 23,060 females in Morayshire, while in Nairn-

shire there were 4975 males and 5479 females. In the former there were 8618 inhabited houses, or one for every five of the population in 1881, and in Nairnshire there were 2077 inhabited houses, or one for every five of the population. According to a register drawn up by the assessor for 1881–82, there are 1617 voters in the county of Moray, 943 in the royal burgh of Elgin, 426 in the royal burgh of Forres; and in 1858 there were 116 voters in the royal burgh of Nairn, and in 1881, 387. The total number of voters in the county of Nairn in 1858 was 149, and in 1881 it was 293.

Climate.

In Moray and Nairn shires the climate is variable, but, as a rule, it is dry and warm. The lower half of both counties is nearly as dry as any part of Scotland. The average rainfall during the year is from 25 to 28 inches, and the mean temperature about 48°. The prevailing winds, which blow for about 260 days during the year, come from the west, and from this direction we are accustomed to have the heaviest rainfall. The lowering clouds in their course northwards are arrested by the range of mountains on the south and south-west of the counties, and thus their watery contents seldom reach the seaboard districts of Moray and Nairn. The rainfall in the neighbouring counties of Banff and Inverness is much heavier. In the upper and hilly districts the temperature varies greatly. It is usually much colder than in the maritime divisions. It is an old saying that the people in Morayshire enjoy forty days more summer than any other county in the north of Scotland. It frequently occurs, however, that the farmers in Morayshire have too much sunshine in the absence of moisture. During the months of June, July, and August they would often welcome more rain than it is their lot to have. The long fertile plain, stretching from the Spey to Inverness-shire, has a tendency to drought, and in a dry summer, with scorching sunshine, much damage is done to vegetation. The upper parts are more retentive of moisture than the lower parts, and the loss sustained from drought, except in very dry seasons, is trivial. The climate of these districts is very suitable for the cultivation of oats, while in the lower parts it is more in favour of the cultivation of wheat and barley, which are extensively grown. In Nairnshire the soil is of a somewhat light and sandy character for the growth of wheat, but barley and oats are found to be most profitable. The rigours of winter along the seaboard districts, being greatly softened and modified by the influences of the sea breeze, are scarcely ever felt with intensity. Frosts, in the absence of snow, however, frequently prove damaging to the root crop, when it is not lifted before Christmas. The

poignant north and north-easterly winds sweeping over these counties are somewhat severe upon both animal and vegetable life, but generally the climate in Moray and Nairn is healthy. In fact, in the seaboard parts, it is believed to exercise a medicinal effect on the constitutions of weak people. The most unequivocal proof of the remarkable mildness and geniality of the temperature in the "Laigh of Moray" is afforded by the fact that apricots, nectarines, and peaches ripen on walls in the open air. In the upland districts both seedtime and harvest are often late, but in the lower districts harvest usually commences early in the season. Winter wheat is sown in the end of autumn, and spring varieties in the month of February. Barley and oats are sown during the first half of the month of March in the later localities, but not quite so early in the earlier climes. In ordinary years, reaping is the leading operation in the end of August and the first of September. I am obliged to Mr Webster, gardener, Gordon Castle, for the following extract from his notes, taken there for the long period of thirty-one years, the object of observation being intended as an indication of earliness or lateness of the season at the time taken. The apricot trees, from which the notes are set down, are growing against a south wall of brick, and 14 feet high, free and open to all changes of weather, and the dates were the days on which the first full expanded flower was seen. Mr Webster proceeds—"It will be seen from the subjoined statement, that the blossom was open in 1874 seven days earlier than in 1882, and one day earlier than in the year 1869. Mignonette survived the winter in 1874, and continued flowering through the following summer. Lilacs and horse chestnuts in flower 25th April, while hawthorn blossom open 2nd of May; and in the same year apricots were ripe at 22nd July, thus showing that the mild winter and early spring were followed by a warm summer.

Dates of Apricots Flowering.

Year.	Date.	Year.	Date.
1852,	February 28	1868,	March 2
1854,	March 2	1869,	February 12
1855,	„ 8	1870,	March 9
1856,	„ 1	1871,	„ 3
1857,	„ 1	1872,	February 20
1858,	February 25	1873,	March 2
1859,	„ 22	1874,	February 6
1860,	March 9	1875,	March 7
1861,	February 24	1876,	February 26
1862,	„ 28	1877,	March 3
1863,	„ 24	1878,	February 23
1864,	March 2	1879,	March 10
1865,	„ 15	1880,	February 20
1866,	February 23	1881,	March 14
1867,	„ 21	1882,	February 13

I am also indebted to the same gentleman for the following record of the rainfall at Gordon Castle since 1860:—

Year.	Rainfall.	Year.	Rainfall.
1860,	28·25	Brought forward,	343·29
1861,	36·18	1872,	43·67
1862,	31·47	1873,	32·31
1863,	26·58	1874,	28·17
1864,	30·28	1875,	31·07
1865,	23·57	1876,	35·95
1866,	27·85	1877,	35·41
1867,	26·65	1878,	35·23
1868,	29·23	1879,	28·36
1869,	30·84	1880,	28·99
1870,	23·56	1881,	27·19
1871,	28·83		
Carry forward,	343·29	Total,	670·64

Average for 22 years, . . . 30·064

I have been favoured, by a careful observer in an inland district, with the subjoined account of the rainfall in Nairnshire during the past decade:—

Year.	Rainfall.	Year.	Rainfall.
1870,	21·16	Brought forward,	205·38
1871,	27·35	1877,	38·64
1872,	36·07	1878,	30·79
1873,	33·87	1879,	28·37
1874,	29·98	1880,	29·79
1875,	27·17	1881,	28·11
1876,	29·68		
Carry forward,	205·38	Total,	360·98

Average for 12 years, . . . 30·098

Through the courtesy of Mr Duncan, druggist, Grantown, I am enabled to give the annual rainfall there since 1867:—

Year.	Rainfall.	Year.	Rainfall.
1867,	29·46	Brought forward,	254·96
1868,	28·62	1875,	31·65
1869,	33·54	1876,	31·64
1870,	28·26	1877,	37·71
1871,	27·27	1878,	34·43
1872,	42·63	1879,	27·75
1873,	34·28	1880,	29·69
1874,	30·90	1881,	24·67
Carry forward,	254·96	Total,	472·50

Average for 15 years, . . 31·750

Geology—Soil.

In the geological formation of these counties the Lower Silurian predominates. The chief rocks are mica slate, clays, chlorite, and gneiss, based upon quartzose rocks, flagstones, and associated

with limestone. Granite and gneiss are found to prevail most extensively in the hilly districts and higher sections of the Findhorn. The former is also the characteristic stratum of considerable portions of the parishes of Knockando, Rothes, and Ardclach, while gneiss occupies nearly the whole of Califer Hill. The old red division extends from Buckie in Banffshire, along the plain of Moray, and disappears at the base of Pluscarden hill. At Clune, in Nairnshire, an oval patch of the same formation is observed, as well as other two small portions a little further west —one at Cawdor and another on the borders of Inverness-shire. These are supposed, in fact stated by geologists, to be subnascent patches of a subterraneous continuation of the belt of Old Red Sandstone, which would seem to terminate at the hill of Pluscarden. This belt is an average width of from three to four miles. The grey or middle division of sandstone occupies Newton, Moor of Alves, Burghead, Hopeman, Lossiemouth, and the lower sections of the Findhorn; in fact, all the coast side from 6 or 8 miles inland, from Lossiemouth to the western extremity of the county of Nairn. The largest of two beds of inferior oolite was discovered in the parish of Duffus, lying in the shape of a lump of fish roe, and surrounded by grey or middle division of sandstone. The only other bed is very much smaller and lies near the village of Lhanbryde. Purbeck beds of wealden have been found at Linksfield, Pitgaveny, Spynie, Waukmill, and Maryhill in Moray. The band of limestone on which Elgin is built is an average width of about two miles, and extends from Boars Head, between Lossiemouth and Garmouth, to near the hills of Dallas. There are several limestone quarries worked pretty successfully on this ridge. Rock is found at Birnie, Relugas, and Craigellachie. Rolled boulders of red porphyritic granite are found strewed numerously over the face of the low country. Lead has been discovered at Lossiemouth, and mining machinery was brought into operation some two or three years ago. In Nairnshire, dark blue limestone has been disclosed, which burns in fire without losing bulk. On the bank of the Spey, near Orton in Morayshire, is an almost vertical red cliff, which changes its colour before rain from red to dark crimson, and in wet weather, blood-like torrents fall into the river. An immense accumulation of sand, which had gathered during a very few hours at a point called Culbin, between the burgh of Nairn and the village of Findhorn, converted a considerable extent of excellent rich fertile land into a vast sterile desert, known as the Culbin Sand Hills. The sands of Culbin, says a writer, are literally a desert of many hundred acres in extent; no plant except the bent grass finds rooting here, from the continued shifting of sand, which by the prevailing west wind is carried to the eastward, but in ordinary states of the weather

is intercepted by the river Findhorn and carried out to sea; forming a bar here, it is taken up by the inshore tidal current running to the westward and carried in that direction, and thrown out on the shore, where the wind forces it to the eastward, thus forming an endless circuit. Culbin sand hills rise to a height of 118 feet above low-water mark. The general height of the beaches above low-water mark is from 14 to 18 feet. It is well known that all the different geological formations or rocks have their characteristic varieties of soil. As might naturally be inferred from the fact, that the geonostic features in these counties are variable in the extreme, the soil is of a very changeable character. To begin with, the character of the soil in Morayshire may be summarily put down in the following terms :—If all the arable grounds in the county were distributed into 63 parts, sandy soil would be found to cover 24 of these, clay 11, loam 27, and reclaimed moss 1. In Nairnshire the soil varies from light fertile loam to heavy mould, and is intersected by patches of sharp gravel and moss. The plain of Morayshire chiefly consists of a light porous soil, intersected with stretches of stiff clay, loam, and rich alluvial deposit. Considerable portions of Duffus and Drainie, two very important agricultural districts, had at one time been submerged by the sea, and in all probability been under it for a lengthened period. Both these parishes, as well as the parish of Alves, to the south-west of them, contain an admixture of rich loam, heavy clay, sand, and fine free loamy soils, with ingredients which never fail to yield superior crops, and which are admirably adapted for the raising of wheat, barley, and potatoes. This division of the great maritime plain has been appropriately named the "Granary of Moray." Duffus and Drainie are low and level throughout. There are other districts in Morayshire which contain fine friable soil. Rich fertile loam prevails in the parish of Kinloss, which is very favourable for arable farming. The northern half of the parish is level, while the southern half rises with easy acclivity until it reaches the heath-clad hills. The average depth of the soil runs from 18 inches to 3 feet, and rests on a subsoil varying from yellow or blue clay to red or white sand. It is most suitable for the production of wheat and barley.

The adjoining parish of Forres has a preponderance of rich loamy soil, although there are patches of clay and gravel. The subsoil is also gravelly. To the west of Forres the soil is generally good, and favourable to the growth of all kinds of cereals, and particularly barley, which may be called the staple crop of the county. The parish of Rafford has great diversity of soil, but is mostly low and fertile. Further south, into the Edinkillie district, loamy soil prevails. Oats and barley are the principal cereals grown. Still further inland, where the land

rises gradually, the soil becomes less porous. A clay loam predominates in the parishes of Cromdale and Knockando, which have altogether a different exposure from the lowland districts. They slope gently to the south, and are hemmed in by hills. In the latter district there is a large extent of moss worked into a condition for tillage, while there is also some in the parish of Cromdale. Oats are the most suitable cereal for this part of the county, but barley is also grown pretty extensively. In descending to the Rothes district, we find that the soil changes into a medium fertile loam, varied by patches of gravel and of deep black loam deposited by the river Spey. Near the village of Rothes there is a considerable stretch of "haugh" land of a most kindly nature. On the east side of the Spey the soil is partly of a sharp porous nature, and is most suitable for the cultivation of oats. Over the eastern half of the county of Moray light sandy soil prevails with trifling exceptions. The parishes comprising this division are Speymouth, St Andrews, Lhanbryde, Elgin, Birnie, Dallas, all of which are well adapted for the cultivation of wheat, barley, oats, turnip, and potatoes. The prevailing stratum throughout these districts is Old Red Sandstone, which is of a very solid description. There is also a large extent of adhesive clay in this portion of the county. The Speymouth and Urquhart districts, like those of Duffus, Drainie, &c., are close to the seaside, where considerable quantities of fish offals are applied along with other manures, which prove to be most efficacious in fertilising the soil, and which go far to secure superior crops.

There are still some small areas of waste land throughout these counties, which may probably be brought into cultivation before the close of the present century. During the past twenty-five or thirty years, the land in both Moray and Nairn has been very much fertilised by the judicious application of manures.

The soil in Nairnshire generally is equally sandy, and in some districts even lighter and more spongy than in Morayshire. In the higher districts, in which the prevailing rocks are mica slate, flagstone, and limestone, the soil is open and gravelly. Here oats and barley are the staple cereals. In the lower districts, a free loamy soil, with patches of sand stretching through it, prevails. A stiffish clay, and sometimes a sharp gravelly soil, abound in the western portion, while in the parish of Nairn the soil is very variable. The rental per acre ranges from 18s. to 35s., according to the nature of the land. There is a heavy mould in the south and a light in the north. In Auldearn parish, the soil is light and fertile, and in the parish of Cawdor the land is rich, and favourable for the cultivation of oats.

State of Agriculture prior to 1858.

Although the subject proper of this treatise is limited to a period of twenty-five years, it may be interesting to glance briefly at the state of the agriculture of these counties a century ago. This will bring the rapid progress of recent years more forcibly under the reader's view. A hundred years ago, farming in Moray and Nairn was of little moment compared with that of the Lothians and south of Scotland generally. The counties were far behind in everything pertaining to agriculture, and had been so from the era of the Reformation. In the end of the eighteenth century the same kind of cereal and root crops were cultivated as those of the present day, but in much smaller quantities. Except among the poorer tenants, whose cropping was unavoidably restricted to oats, large quantities of flax were raised annually. Oats and barley were reckoned the staple produce. Over the upper districts of each farm about two-tenths were usually in oats, one-tenth in barley, two-tenths in peas, turnip, and potatoes, and three-tenths in grass. In the lower districts about three-tenths of each farm were sown in oats, one-tenth in wheat, one-tenth in barley, two-tenths in turnip, peas, beans, and potatoes, and three-tenths in grass. The following will give an idea of the general course of management on the larger farms :—Oats were sown after barley, grass, or wheat, from the 1st of March to the end of April, at the rate of four-fifths of an English quarter to the acre. The yield was on an average about four quarters of grain to the acre, and from each quarter about 9 stones of meal avoirdupois weight were obtained. In the higher districts, where the climate was severe, and the soil stiff and wet, varieties of small black hairy oats were cultivated, but were of comparatively little value, and were given up soon after the beginning of the present century. When intended for the growth of barley, the land received three successive ploughings, and manure if this crop had not been preceded by a green crop to which manure had been applied the previous year. Manure was invariably applied to wheat, which was, as a rule, sown on clean or fallow land. Three bushels seeded an acre, and from 5 to 6 quarters were the quantities returned. The seed was generally steeped before being sown. For the cultivation of turnips the ground was well pulverised by three or four ploughings and harrowings. A liberal supply of dung was given, and the seed was sown in drills as now. The turnips were mostly consumed by cows and young cattle, there being no systematic plan of cattle feeding. Potatoes, which had been introduced to this country about 1728, were not cultivated in these counties till about the middle of last century. They did not even then become a general farm crop.

At the corresponding period of last century, potatoes were said to have been cultivated sparingly. They were scarcely ever used as food for cattle. The seeds were planted 3 or 4 feet distant from each other, and the medium yield per acre was about 800 stones avoirdupois weight. The kidney-shaped potato was most cultivated for the table. The sowing of grass seeds was not introduced so early as the potato. The land in the higher districts was not capable of producing clover in great abundance until lime or marl was applied to it, and turnip and sown grass have been about the same time in existence over these counties. Clover was sown in quantities varying from 12 lbs. to 16 lbs. per acre, along with barley and oats, but seldom with wheat, and was generally consumed in pasture. On the larger and better farms the plough was kept going with a pair of horses or oxen and a man, but on the smaller and more insignificant holdings as many as six and eight oxen were used in each plough. Cattle and horses were then of a very indifferent description. The best cows were worth only from £5 to £12 each. Except on farms adjoining hill pasture, few sheep were to be seen in the country. Neither wool nor mutton were of much importance. Away up among the hills, where whole glens of arable land are hemmed in with heath-clad hills, the blackfaced breed was pretty extensively reared, and each animal was valued at 12s. or 14s.

The leases granted to tenants were as a rule of nineteen years' duration. The rents were paid partly in money and partly in grain. The office houses were generally built by the tenant, who received compensation for them at his exit to the extent of two years' rents. They were as a rule substantially built of stone and lime, and thatched with straw or other material.

It would appear that the tillers of the soil were not then sensible of the great advantages to be derived from having their fields enclosed. About 1782, Moray and Nairn, like other northern counties, were, it may be said, open from end to end. It is stated that after the various crops were ingathered, the whole range of country was put under the head of "Common Good," and all the respective flocks of sheep and herds of cattle depastured together wherever they might choose to wander. Comparatively little food was stored for winter use, and cattle were generally in very thin and weak condition by the return of the grazing season.

Till near the opening of the present century, farming implements were of the rudest and most primitive description. The old clumsy timber plough was in vogue among the poorer classes till the end of the eighteenth century. It was made wholly of timber, except the coulter and sock, exclusive of which the average price of the plough was 4s. or 5s. The

better class of farmers had ploughs of the newest design, which were neatly made, and cost about 2 guineas. Carts were of the most approved construction, costing from £8 to £10 each, and were generally drawn by one horse, but in exceptional cases by two. The "flail" was used on every holding, as threshing mills were not then plentiful.

About the middle of last century, the average price of grain was something like 12s. per boll, and the yearly wages of ploughmen ranged from £2 to £3. The most lucrative branches of farming were the raising of corn and the rearing of cattle. For the latter, however, there was little outlet when they were fattened. Swine were seldom reared by the farmer, although pork was greatly in demand in this part of the country.

Among the inhabitants of these counties, during the greater part of the eighteenth century, kail, nettle, and mugwort were favourite dishes when stirred up amongst oatmeal soup. Oatmeal, bran, and sowans, when slightly fermented together, formed a regular article of food in the north of Scotland. The traditional Christmas luxury was sour cakes with aromatic seeds, which it was considered formed one of the most palatable and delicate repasts that could be got.

Up to the first of the present century, pasturage was more extensively pursued than tillage. Shortly after the advent of the nineteenth century, however, a much more enterprising system of farming was adopted, and the agriculture of these counties was rapidly brought into a state which compared favourably with that of the Lothians. It is but just to say that Moray and Nairn, in so far as the cultivation of the soil is concerned, have been keeping pace with, if not surpassing, the improvement in the most active of the other parts of Scotland. Sixty years ago the soil received more attention than the breeding and rearing of live stock. The cattle then reared in this part of the country were of an inferior description, but the horses in possession of the better class of north country farmers were equalled by few even in the south of Scotland. They were strong horses, of good blood and superior action. The common breed of cattle was black, with long horns and of great variety of size. One of the most successful of the present race of farmers in Morayshire informs us that, some fifty or sixty years ago, the ordinary commercial cattle when rising three years of age, sold at from £3, 10s. to £4, 10s., and on one occasion three or four fat animals brought about £12 each, which was considered a very remarkable price. The same animals would now bring at least £27 each.

After 1830, much attention was given to the breeding and rearing of cattle, and few counties have achieved greater success in this direction. Shorthorns were early introduced, bulls of

this valuable breed having been mated very freely with cows of the native race. At first the shorthorn crosses were unpopular, but by the force of merit they soon rose in favour. Polled Aberdeenshire cattle were to be met with in some parishes. Farmers' societies, viz., the Morayshire Farmers' Club and Nairnshire Farmers' Society, have long been in existence in these counties, and unquestionably gave great encouragement to agricultural advancement, especially to the improvement of live stock. Sheep were plentiful among the hills, but not in the lowlands. Blackfaces were the principal breed. Swine were driven about and fattened along with cattle. Artificial manures, in the form of crushed bones, were applied to the land in quantities varying from 15 to 20 bushels per imperial acre when preparing for a crop of turnip. Many people adopted a more economical mode of manuring, by dibbling and putting the bones into small holes before the seed was inserted. It is asserted, that equally as heavy crops of roots were raised by this as if thrice the quantity of manure had been sown broadcast. The land under wheat, barley, oats, and potatoes increased every year very materially up to a few years ago. Lime, as a fertiliser, was liberally used, from 120 to 140 bushels having been given to each acre of light land, and about 200 bushels to the imperial acre of strong soil. Generally speaking, the five-shift rotation was pursued on the majority of holdings, while some farmers worked on the six-shift course. Draining was very extensively executed, and in most cases with stones and brushwood. The average rental of land varied from £1, 4s. to £2 per Scotch acre. The best haugh land was rented at from £1, 12s. to £2, 8s. per imperial acre.

The rate of wages for farm servants, who as a rule lived in the farmers' kitchens, was for men, from £9 to £10 per annum, and for women from £4 to £5, exclusive of board. Male labourers engaged by the day got from 9s. to 9s. 6d. per week, and females from 3s. to 4s. per week. Threshing mills have been used on the larger farms for a number of years. The harrows were made of wood, with iron teeth, and in fact on some holdings these have not been long out of use. As the century advanced, agriculture became more important, and claimed greater attention than it received prior to 1828. In 1842 the area of Moray included 536,600 acres; of these 120,000 were under cultivation, and the remainder under wood, or pasturage, or heath.

The Progress of the past Twenty-Five Years.

The area of land reclaimed since 1857 has not been great. This, however, is not assignable to any lack of spirit or enterprise on the part of either landlord or tenants, but to the fact

that the active agriculture which existed between 1830 and 1850 had left little room for improvement. The reclamation of land during the previous twenty years had been very extensive. The many intersected and unseemly patches of waste land which were to be met with in these counties some thirty or forty years ago, have mostly all been brought under the plough, while in inland districts farmers have been extending their holdings very considerably. The most noteworthy improvements executed since 1857 have been in the way of squaring up farms, forming drains, fencing, renovating farm steadings, and building farmers' dwelling houses and servants' cottages. Perhaps few counties are better supplied with good farm buildings than Moray and Nairn. In this way the improvement has been very considerable both to landlord and tenant. In cases where farm steadings were erected, the tenant had generally to provide material for building; and in many instances he also built the steading, the proprietor compensating him by what is called payment for "meliorations" at the expiry of his lease. It is now more frequently the case, however, that the landlord erects the houses and the tenant pays 5 per cent. of interest along with his rent.

Some twenty-five or thirty years ago, farms were very irregularly laid off and cropped, but they are now much more systematically and skilfully wrought.

That the improvement in fertilising the soil within the past twenty-five years has been great, is an unquestionable fact. The principal agencies for the development of the farming resources in this way have been the judicious and liberal application of artificial manure, the systematic and enlightened management of farms, and the wisdom and care exercised by the tenants in maintaining the richness of the soil. There has been a very marked improvement in cattle in these counties within the past twenty-five years. Careful and judicious crossing on the part of the breeder has greatly increased the symmetry and beauty as well as the size and usefulness of stock. Notwithstanding the serious losses sustained in some districts in 1876, in consequence of the cattle disease, the breeding and rearing of cattle has been kept going successfully since then, and the effects of the disease are now almost invisible. However, many people maintain that the disease laid the foundation of the present agricultural depression in this part of the country. Sheep farming cannot be said to hold a more important position in Morayshire, than it did thirty years ago; but in parts of Nairnshire where the soil is of less value, sheep farming is receiving more attention. The price of wool for the past few years has been rather fluctuating, and on the whole the tendency has been downward.

The rapid development of the resources of the soil has naturally led to a corresponding advancement in the improvement of agricultural implements. These counties have made marked progress in this respect. Ploughs have been remodelled, chain or link harrows have been introduced, and are now pretty extensively used. Double-furrow ploughs have been successfully wrought on several of the larger farms in both counties, while steam cultivation has been pursued to some extent.

In order to show the position which these counties occupy among other counties in Scotland, in respect of the agricultural improvements executed during the past twenty-five years, I subjoin in tabular form a comparison of the extent of cultivated area and the number of cattle and sheep between the years of 1854 and 1880, thus :—

	For 100 acres cultivated area in 1854 there were in 1880,	For 100 cattle in 1854 there were in 1880,	For 100 sheep in 1854 there were in 1880,
Aberdeen,	111	106	136
Argyll,	44	84	152
Ayr,	92	106	183
Banff,	117	111	142
Berwick,	112	93	126
Bute,	103	80	144
Caithness,	105	75	113
Clackmannan,	60	79	68
Dumbarton,	100	100	167
Dumfries,	93	112	142
Edinburgh,	105	119	156
Elgin,	100	100	91
Fife,	102	99	109
Forfar,	105	92	117
Haddington,	105	88	146
Inverness,	74	139	123
Kincardine,	105	94	92
Kinross,	78	71	122
Kirkcudbright,	89	115	156
Lanark,	93	109	169
Linlithgow,	100	100	137
Nairn,	60	82	147
Orkney and Shetland,	220	100	211
Peebles,	86	80	149
Perth,	82	99	143
Renfrew,	95	108	190
Ross and Cromarty,	88	145	125
Roxburgh,	120	92	145
Selkirk,	116	122	156
Stirling,	91	107	194
Sutherland,	120	113	133
Wigtown,	94	111	172
Total Scotland,	95	103	143

The decrease in the first column, in whatever county it occurs, is accounted for by the inclusion in 1880 of tracts under

permanent pasture, which in 1854 were classed as heath or mountain land.

Coming within the period of twenty-five years, over which the report is meant to extend, we find it necessary to explain that the Highland Society, in drawing up the agricultural returns in 1857, excluded all holdings under £10 of rent, and therefore we are unable to indicate the accurate increase in the acreage under rotation of crop since that year. The following table, however, shows the increase since 1870 :—

	Moray.	Nairn.
Arable area in 1857,	82,401	30,311
„ 1870,	100,450	24,443
„ 1876,	103,698	26,070
„ 1881,	105,226	26,359
Increase since 1870,	4,776	1,916
„ 1876,	1,528	489

The percentage of arable area in Morayshire under cultivation in 1870 was 29·5, and in 1880, 30·9. In 1870 the percentage in Nairnshire was 17·8, and in 1880, 19·2. Since 1870, it will be observed, the arable area under cultivation has been increasing at the rate of about 434 acres per year in Morayshire, and about 174 acres in Nairnshire.

The following tables show the valuation of both counties since 1866–67, according to the valuation roll :—

	Moray.		
Valuation in 1866–67,	£133,794	19	0
„ 1872–73,	170,099	11	0
„ 1882–83,	159,125	13	0
Increase since 1866–67,	25,334	14	0
	Nairn.		
Valuation in 1866–67,	£27,735	17	8
„ 1869–70,	28,417	17	1
„ 1881–82,	34,284	19	3
Increase since 1866–67,	6,549	1	5

The many and extensive agricultural improvements effected in Moray and Nairn during the past twenty-five years would be insufficiently indicated in a generalised report. We therefore deem it necessary to give, as succinctly as possible, the following notes which we collected in a recent pedestrian tour throughout both counties :—

Details of Improvements and the different Systems of Farming.

Morayshire.

Commencing our tour at the most eastern point of Morayshire, we find ourselves in the parish of Speymouth, which has an area of fully 6352 acres. Its rental in 1866–67 was £6204, 3s., and

in 1882–83, £6581, 15s. The villages of Garmouth and Kingston occupy the north-eastern corner of the parish, while the larger proportion of it is under cultivation. There is a good deal of wood and natural pasture. The land along the bank of the Spey, from Craigellachie to the sea, consists of rich alluvium and sandy loam, resting on a subsoil of gravel. The rent runs from 10s. to £2, 10s., and is an average of about 26s. per acre. The farm of Newton is pleasantly situated about a mile from Garmouth and near the river Spey. Its extent is 250 acres, of which 20 acres consist of rough pasture. The rental in 1866–67 was £185, 12s., and now it is £250. Under the regulations of the Duke of Richmond and Gordon's estate, the tenant of Newton has adopted the best system of farm management. He believes in the six-shift rotation, viz., oats and wheat, turnip, barley, and three years' grass. On land adapted for the rearing of both cattle and sheep, no other course could be more profitable. The six shift keeps down expenses both in labour and manure, and gives power to keep a good stock in summer, specially of sheep, which have paid all along in this part of the country. The seven-course shift would shorten farmers of turnips, which never fail to yield well on this farm and locality. As a rule, good crops of all kinds are obtained in this district. In preparing land for turnip, the tenant ploughs his stubbles in autumn from 8 to 10 inches deep, thus giving it full benefit of the winter frosts ; and if the month of February is suitable, he cross ploughs it, and is always careful to avoid working it in a wet or raw state. He finds it most beneficial to let the land, after cleaning, rest for a fortnight before drilling it, which insures a braird, and suits better in every way than opening up the soil in too fresh condition. The tenant disapproves of light manures, and says "they exhaust both the land and the pocket." He principally uses bone manure. For the potato crop the land is prepared similarly to that for turnips, and from 12 to 16 loads of manure, direct from the farm-yard, per acre, is spread in the bottom of the drills. The tenant does not approve of sowing artificial manure in the bottom of the drills for potatoes. Cattle on Newton are chiefly crosses with a few polled animals. About half the wintering stock is bred on the farm, and the other half bought in. Not later than September, 20 two-year-old stots and queys are housed and fed on turnips and straw, and when within two months of selling off some grain and cake are given, increasing the latter until the animals are disposed of. At the new year the queys weigh about 5 cwt., and the stots are usually sold off in April, when they weigh from 6½ to 7 cwt. From 7 to 8 scores of Cheviot ewes, bought in in the fall of the year, are kept, and a crop of lambs taken, which are sold off at weaning time, when the ewes are fattened, and as soon

as they are disposed of another lot of ewes is bought in. This pays remarkably well. Besides supplying the sheep of the farm with turnips, Mr Annand lets from 12 to 15 acres every year at from £6 to £7, 10s. per acre. About 80 acres of land are allotted to a pair of horses. One-sixth of the farm is annually under turnips, of which two-thirds is Swedish, two-sixths under grain crops, the half of which is barley, and the other half wheat and oats. In a good season wheat is the most renumerative cereal.

In moving westwards there is much fine scenery to attract the eye. Clumps of wood are to be seen on every hand. Emerging out of the Speymouth parish, we enter into that of Urquhart, where there is also a considerable breadth of good land, but it is lightish in some parts. The climate is early and warm. The average rental varies from 17s. to 19s. per acre. Near to the village of Urquhart lies the well-managed farm of Innesmill, tenanted by Mr John Brown. The area of this farm is 105 acres, and is wholy arable. There is a deal of light land on it. Contrary to the general rule in this district, Mr Brown works the six-shift course, and finds it to be the most profitable system. The average yield of all kinds of grain generally is about 4½ quarters per acre, but it is usually over 5 quarters on Mr Brown's farm. In preparing the land for turnips, Mr Brown ploughs heavy in autumn, ploughs again in April, and grubs if the land requires it. He does not approve of much grubbing. About 15 loads of farm-yard manure are given per acre, along with 10 bushels crushed bones and 3 cwt. light manure. The general rate of manuring in the district is not so high. Mr Brown grows only a small extent of potatoes, and after preparing the land the same as for turnips, gives about 10 loads of dung and 3 cwt. of light manure per acre. Since the present tenant entered the farm in 1865, he has drained and limed a good deal, and enhanced the value of the farm considerably. He keeps cross bred cows and a shorthorn bull, breeds about two-thirds of his stock, buys in the other portion in the end of the year, and ties up his feeding cattle about the end of September. He sells his queys when six quarters old, each weighing 5 cwt. The stots are kept until they are two years old, when they generally weigh about 6½ cwt. Turnips and straw constitute the principal aliment, and a little corn and cake are allowed to the feeding stock before sending them away. Mr Brown finds that home-bred animals thrive best. There are very few flocks of sheep kept in this district. Generally, as on this farm, a pair of horses work about 60 acres. The rate of wages has advanced fully 30 per cent. on Innesmill. There is a rise of rent since 1857 in some cases, but not universally, throughout the parish. Mr Brown suggests at least one change

in the present system of farming, which he thinks would be beneficial, and that is freedom of cropping. He grows two-thirds of the turnip break in swedes, and one-third in yellow turnips. Barley is generally the best paying crop, but it will not pay to sow barley crops in rapid succession, because they soften the soil too much. The extent of this parish is about 13,660 acres, and the valuation of it was £7843, 19s. in 1866–67, the increase since then being £8052, 14s.

In the districts to the east of Elgin, the Earl of Fife is the principal proprietor. His residence is Innes House, in the parish of Urquhart, which nestles beautifully among trees, and is surrounded by fine pleasure grounds. The extent of Lord Fife's property here is 41,759 acres 1 rood 30 poles, of which 20,577 acres 1 rood 36 poles are arable, 12,081 acres 1 rood 7 poles pasture, 7729 acres 1 rood 24 poles wood, and 1371 acres 33 poles consisting of rivers, burns, canals, ditches, peat mosses, hillocks of bent, sea beach, roads, &c. In 1866–67 the valuation was £18,383, 12s., and now £19,758, 3s. There is great variety of soil throughout the estate. It consists of rich clay loam, sandy loam, light sandy soil, moorish gravelly soil, and pan. The climate is, as we have previously stated, favourable in the highest degree. Farms range from 20 to 400 acres in extent, and crofts from 2 to 12 acres in size. On most farms, steadings and farm houses are very good, many having been erected within the past twenty-five years. All of the recently erected houses, except those of a few small crofts, have been built of stones and lime, and are slated. The buildings on these crofts in not a few cases consist of what is called "andinharlie," or, properly speaking, stones, clay, and straw thatch. This sort of buildings lasts for generations when the roofs are kept tight, and are usually very comfortable.

Servants' cottages have increased greatly since 1850, and especially in recent years. The roads over the estate are good. During the past twenty-five years a considerable breadth of land has been reclaimed by trenching and ploughing with horses and steam.

The value of the land before reclamation was about 1s., and now it is worth from 7s. to 15s. per acre.

The newly reclaimed land has already yielded profit, and is expected to be still more valuable in the course of a few years. Extensive improvements have been effected in the way of draining, squaring up farms, and planting, mostly fir and larch, the latter being generally used where woods have been cut down.

The duration of lease is nineteen years, with entry at Whitsunday term, to which we shall subsequently allude. Tenants get every encouragement possible in executing improvements on

their farms. Allowances of money are agreed upon at entry, which, according to the regulations, has to be refunded at the end of the lease.

The extremes in the rental of this property are 7s. and £3 per acre. Rents are all paid in money, but some thirty years ago, grain payments were quite common. The five-shift is the prevailing rotation, not only on these estates, but over the counties generally.

The sort of cattle kept by the farmers on Lord Fife's property is chiefly cross bred, with a sprinkling of pure bred shorthorn and polled animals. Much more attention is bestowed on the breeding and rearing of stock than twenty-five years ago, and during the interval between 1857 and 1882 a striking improvement had been effected in the various breeds.

Cattle feeding is now one of the chief, if indeed, not literally the principal source of the farmer's income. The greater proportion of the commercial cattle on the estate are bought in, and these along with home-bred stock are partly fed in half-roofed courts, and partly in stalls. Feeding generally commences about the 1st of October. There are very few holdings on this estate that could come under the head of sheep farms, but large flocks of crosses between Leicester tups and Cheviot ewes are bought in and fattened during winter. These, as well as a few blackfaced sheep, are kept steadily on farms attached to hillsides, where the pasture consists of heather and natural grasses. The great body of crofters make a living by working on their own crofts, and occasionally by day labour to neighbouring farmers. They hold yearly leases as a rule, but in some cases, when circumstances permit, longer leases are held.

Resuming our westward journey, we reach the farm of Upper Meft, which is 230 acres, all arable, in extent; rented at £291, 15s.; is well laid off; well supplied with convenient houses, and tenanted by Mr Cruickshank, who has improved the condition of his farm materially since 1857. He works it on the five-course shift, and the average yield of wheat is from 3 to 4 quarters, barley 5 quarters, and oats from 4 to 5 quarters.

The beautifully situated and well-managed farm of Viewfield tenanted by Mr Anderson, extends to 282 acres,—279 acres arable and 3 acres in pasture. It is rented at £305, or from 21s. to 22s. per acre. The soil consists of loam, black soil, and moss, and is pretty well sheltered. The estate regulations insist on the five-course shift being pursued, but Mr Anderson would prefer to work at least part of his farm under the six-shift system, which he is convinced would be instrumental in preventing "finger-and-toe" and "canker," which frequently destroy the turnip crop.

The average yield of wheat ranges from 3 to 5 quarters, and

weighs 64 lbs.,—in 1880 it weighed 66 lbs.; Norfolk barley, which he finds to yield better than chevalier, from 4 quarters to 5½ quarters, weighs about 56 lbs.; and oats from 5 to 6 quarters per acre, weighing 42½ lbs. and in exceptional cases 44 lbs. per bushel. Mr Anderson has no anxiety to hold down the manure bill. He gives land intended for cereal crops about 20 loads of dung in the autumn, and that which does not receive this gets from 1 cwt. to 2½ cwt. of artificial manure. He tried an experiment in the manuring of land for Swedish turnips a few years ago, which clearly showed that over much stimulants are as bad as too little. He gave from 2 cwt. up to 10 cwt. of the best turnip manure to the acre, and found that the turnips grown with 5 cwt. were equally as good, both in quantity and quality, as those grown with 10 cwt. of the same manure. Potatoes receive similar treatment to turnips. From 10 to 12 cwt. are planted per acre, and a yield of from 5 to 7 tons is generally obtained. Mr Anderson fenced all the farm when he entered, as well as drained a great deal. His farm steading and dwelling house are very good. He feeds from 20 to 30 cross bred cattle every year, and breeds from 10 to 12. He finds it most profitable not to follow any strict rule, but to dispose of or purchase cattle in any condition when a good bargain can be made. The tenant ties up his feeding stock about the 1st of October, and gives them a full supply of turnips and straw, with from 3 lbs. to 4 lbs. of cake each per day when within three weeks of selling off. The cake is generally given them in the middle of the day. Rock salt is laid in the stalls before the cattle. The usual weight of the animals when fat is from 5 to 8 cwt. Sheep are not kept steadily on this farm, but the grass is let in the end of the year along with as many turnips as can be spared. From £7 to £10 is obtained for an acre of Swedish turnips. There is an excellent stock of horses on Viewfield, being all Clydesdales, and several of them pedigreed and prize winners. They have improved greatly within the past twenty-five years. From 70 to 80 acres are allotted to a pair. The tenant breeds at least one foal every year. Very little hay is grown on this farm, only what supplies it with seed for next crop. The average yield is about 130 stones (22 lbs. per stone) per acre. Wheat pays best in a good year.

Almost in the immediate neighbourhood of the farm of Viewfield is the model farm of Stonewells. Mr Petrie, the tenant, has been a very exemplary agriculturist for many years, and is very careful and judicious in his system of farming. His farm is one of the largest and best managed in the parish. Its extent is 204 arable acres, for which the tenant pays £196, 3s. annual rental. The land is similar to that on the farm of Viewfield. Mr Petrie applies chiefly light manures to his turnips. Potatoes

are grown after grass that has been top-dressed heavily with farm-yard manure before being ploughed, and about 6 cwt. of potato manure is given when the potatoes are being planted. Mr Petrie entered his farm in 1864, and has since then executed considerable improvements in building, draining, fencing, &c., at a cost of £400. The proprietor pays £200 at the expiry of the lease, for improvements made to that extent on buildings. The cattle consist of shorthorns and crosses, about the half of which are bought in every year, and the others bred on the farm. They are taken in off the grass on the 1st of October, and are usually ready for the April market of the following year, and being two years old weigh about 7 cwt. They are partly fed loose in courts, and partly tied up. It would be an advantage if courts were more closely covered over for feeding cattle. Turnips and straw constitute the feeding aliment. With a few exceptions, the cows are allowed to suckle their calves. These calves get sliced turnips in the autumn along with from ½ lb. to 1 lb. of oilcake each per day, which is continued throughout the winter and spring, until they are put to grass.

The cost of labour since Mr Petrie became tenant of this farm has increased at least 35 per cent. In accordance with the regulation of the estate, the tenant works under the five-shift course, but he thinks that the land would be much improved to lie in grass for a few years. He sows about half the turnip land in swedes, and would sow even more of this variety, but some parts of the farm are not well adapted for its production. Barley and wheat are the principal cereal crop. Mr Petrie does not cultivate oats extensively. Barley as a rule is the most remunerative crop, but sometimes in a dry season barley and oats are burnt up, when wheat, which sends its roots deeper into the ground, withstands the effects of drought. The quantities of seed sown per acre runs thus,—wheat 4 bushels, barley 3¼ bushels, and oats 4 bushels. The yield and weight are various, but are about the same as those on Mr Anderson's farm. Hay is always a light crop on this farm. Mr Petrie puts nearly all his court manure upon grass lands, applying it in the autumn after the first grass has been eaten, or early in the following spring. The land to be sown with barley is twice "break furrowed" and then ploughed. Mr Petrie is a very liberal farmer, as may be inferred from the fact that he expends on an average £200 per year for manures, besides the outlay incurred for cake, which is no inconsiderable amount. He has a good stock of strong agricultural horses.

A few miles north-west of Stonewells is the farm of Inchbroom. The present tenant, Mr Ruxton, has improved its value considerably since he entered it some ten or twelve years ago.

It is now in excellent condition, both as regards the cultivation of the land and the convenience and superiority of the farm houses. The holding extends to 420 acres arable, and about 650 acres of links and rough pasture. The present rental of the arable land is £500, and of pasture £80, being about £180 in advance of the rent paid in 1857. The average rental in the lower part of the parish is about 25s. per acre. The soil consists chiefly of sand and clayey loam. On this farm the seven-course shift is adopted, viz., two grasses, oats and barley, potatoes, wheat, turnip, and barley sown with grass seeds. Wheat yields on an average 4 quarters per acre, and weighs 62 lbs.; barley 4½ quarters, and weighs from 56 lbs. to 57 lbs. per bushel; oats 5 quarters, and weighs on an average 43 lbs. per bushel. Barley is grown partly after grass and turnip, and when on two years' old grass a little artificial or farm-yard manure is applied immediately before the seed is sown, in order to insure a good braird. Mr Ruxton, until a few years ago, gave a good deal of artificial manure to all the cereal crops, but he finds it of more value to the following crops, when given to potatoes or turnips instead of cereals. Oats are generally grown after lea, wheat, and potatoes. A good proportion of the land for the corn crops is turned by a steam plough in autumn, and is allowed to lie in this condition till spring, when it is ploughed with a common plough and grubbed and harrowed. Besides dividing the farm-yard manure between the turnips and potatoes, Mr Ruxton gives them artificial manure to the extent of 8 cwt. per acre. He habitually grows wheat after potatoes, because he finds that they prepare the land better for it than turnips do. His shifts contain about 60 acres in each. From 40 to 50 acres of one shift is grown in potatoes, and the rest of it in beans and sometimes turnips. About 12 cwt. of potato seed is planted in an acre, from which about 5 tons are yielded. The yield of turnips average from 15 to 20 tons per acre. The farm has been wholly fenced, partly drained, and houses built, at the tenant's expense, to the extent of £700, during the past ten years. Cross cattle, from shorthorn bull and cross cow, constitute Mr Ruxton's herd. From 20 to 25 calves are bred every year, in addition to which the tenant buys in as many off the grass as completes his feeding stock, which is usually about 40 two-year-olds. The cattle are mostly fed on turnips and straw. Last year, when potatoes were cheap, they were fed partly on them. To feeding animals from 3 lbs. to 4 lbs. of cake per day is allowed, and about 2 lbs. to each yearling. The money expended in cake usually exceeds £100 per year. Two-year-old cattle when fat weigh about 7 cwt. each. Mr Ruxton lets his pasture for sheep during winter. His horses are of the superior Clydesdale breed, and have improved immensely in

recent years. Mr Ruxton has very much improved his farm steading since 1870. It is now one of the best and most convenient buildings in the parish, and is always well kept. The interior arrangements are most complete, and ample accommodation is afforded for his stock. In the breeding of cattle Mr Ruxton is careful and judicious. Only one calf is allowed to each cow until she is over three years of age, when she fosters two every year. The average number of cattle on the farm during the year is about 100. The ordinary stock of horses consist of six pairs, and a few foals are annually reared.

The parish of St Andrews extends to a total area of 9359·544 acres, and is rich both as regards the fertility of the soil and loveliness of the scenery. There is a great quantity of wood growing in it, and it contains some of the finest farms in the county. Its valuation in 1866–67 was £6471, 16s., as compared with £7810, 17s. now. The farm of Pitairlie lies in the lower end of the district, and is 234 acres arable, and from 15 to 20 acres of river banks and pasture in extent. The rental of this farm is 30s. per acre, but the average in the district would vary from 20s. to 25s. The soil is principally clay, and black and sandy loam. Mr Petrie adopts the five-course shift. The average return of barley in ordinary years is about 5 quarters per acre, weighing from 55 lbs. to 56 lbs. per bushel. Wheat yields 4½ quarters per acre, and weighs fully 62 lbs.; and oats about 5 quarters, weighing from 43 lbs. to 44 lbs. Barley and wheat are grown mostly after turnips, being invariably manured, while oats are raised from lea without any stimulants.

In the upper division of this parish there is great irregularity in the size of farms, but taking them all in all they are smaller than in the lower half. In passing through this district we find that there is great variety of soil, it being poor, cold, and wet in some spots, resting on the hard "pan," which is so objectionable but so common in the blackhills district. The climate is uncongenial. The five-course shift prevails. The various crops yield on an average thus,—turnips from 10 to 15 tons per acre, potatoes 3 to 5 tons, barley about 4 quarters, oats 5 quarters. The latter is most extensively grown. Wheat is not cultivated to any great extent. All the farm-yard manure is bestowed on the root crop, along with about 50s. worth of artificial manure per acre.

In the same parish, and in the vicinity of Elgin, are the farms of Tyockside and Stonecrosshill,—150 arable acres and 17 acres pasture in extent. Mr Calder, the tenant, is a very careful and liberal farmer, and has improved the value of his holding greatly since 1857. Land for turnips is allowed from

20 to 25 loads of farm-yard dung and from 4 to 5 cwt. artificial manure per acre. Land for potatoes is prepared in the same manner, and 20 loads of farm-yard manure is allowed per acre, along with from 3 to 4 cwts. of artificial stimulants. Crops yield variously,—barley and oats from 4 to 5 quarters per acre, the former weighing from 57 to 59 lbs. and the latter from 45 to 47 lbs. per bushel. The soil is light, and climate mild and early. The rotation is the five-shift system. The proprietor erected an excellent farm house a few years ago. As to the breed of cattle, Mr Calder has no particular class, but breeds from 16 to 20 annually, and sells them off when one year old, with the exception of a few which he feeds during winter. The feeding material consists of turnips, straw, draff, bruised corn, and oilcake. When fat the cattle usually weigh from 5 to 7 cwt. Being in proximity to Elgin, Mr Calder keeps a dairy, and supplies a good proportion of the inhabitants of the burgh with milk.

Passing onwards, the next parish we enter is that of Drainie, which is 7254·206 acres in extent. Its valuation in 1866–67 was £10,424, 5s., which when contrasted with that of 1882–83, shows an increase of £2013, 4s. The greater part of this parish lies low, and the soil is of a mixed and variable character. Generally, however, it is a lightish loam, pretty sandy in some parts, and dark loam in others. There are considerable knolls of wood to be seen at different points. The largest landed proprietor in Drainie is Sir William Gordon Cumming, Bart. The estate of Captain James Brander Dunbar Brander of Pitgaveny, which is about 3000 acres in extent, of which there are about 2000 acres arable land, 800 acres rabbit links, and about 200 acres wood. According to the valuation roll, the land property was worth £1952, 3s. in 1866–67, and in 1882–83, £2155, 13s. About two-thirds of the arable land on this estate consists of fine black loam like garden soil, and about one-third light sandy loam. The largest farm on the estate is Coulardbank, which is 498 acres in extent, including links, and the smallest 60 acres. In all, there are eleven farms on the property, besides 100 acres let in parks at Lossiemouth. A good many steadings and houses have been built during the past twenty-five or thirty years. At present there are only the houses of one farm out of repair, and arrangements are being made for their renovation. Fencing is done by the tenant, and is chiefly composed of wire. The loch of Spynie has been drained since 1855, adding some 40 or 50 acres to the arable land, which before were an unsightly marsh, and worth very little. The land being light, is worth only about 10s. per acre now. It has not paid the interest of the money expended in reclamation, but it greatly benefits the drainage of the neighbouring farms. Cap-

tain Dunbar says "he has neither lost nor gained much by the drainage of the loch." Over this property nineteen years lease holds sway. Rents are payable at Candlemas or Lammas. In building steadings the tenants drive stones and provide material.

About six acres of land near the manse of Drainie is rented at £12, being the best land on the property. Captain Dunbar's best farm contains 255 arable acres, which is let at £450, or about £1, 15s. per acre. Rents have not risen much since 1857, but there is a yearly increase taken from the feu-duties at Branderburgh. The five-course shift is pursued on most farms, but so long as a tenant farms liberally the proprietor would not restrict him to a specific rotation. There are no regular sheep farms on the estate, but about 200 sheep are kept on Coulardbank. Sheep are wintered on several farms, for which the flockmasters pay from 2d. to 3d. per head per week. No wood has been planted since 1855. Captain Dunbar farms from 70 to 80 acres himself, for which he keeps one pair of horses.

The farms of Sunbank and Wester Oakenhead, which are farmed as one, is the third largest holding on the Pitgaveny estate. The extent of arable land is 250 acres and about 100 pasture. The rental is £411, 3s. The five-course shift is pursued, and a crop of potatoes is taken after one year's grass, being manured heavily with dung and artificial manure. The nature of the soil and climate is favourable. The yield of grain has been falling off in recent years, which the late Mr Rae attributed to bad seasons and overfeeding of land with artificial manure. In preparing and manuring land for turnips and potatoes, court manure is distributed as far as possible, and then artificial stimulants are applied. Great improvements have taken place since 1857 in the way of draining and fencing, mostly done by the late tenant.

The second largest farm on Captain Dunbar's property is Kinneddar, tenanted by Mr Adam. It is about 500 acres in extent, and is all arable. The total rental is £450. The prevailing soil on the farm is a lightish black loam of a porous nature, and resting on a gravelly subsoil. Mr Adam works about 230 acres on the seven-course system, viz., two grasses, and oats, potatoes, barley, turnips, and barley again. The remainder is worked under the five-course shift, viz., two grasses, oats or sometimes potatoes, turnips, and barley. The average yield of the various crops is about 4 quarters barley, 5 quarters oats, 6 tons potatoes, and from 16 to 20 tons of turnips per acre. Land for the root crop is tilled in the ordinary way, and about 20 loads of dung and 4 cwts. of bone meal given per acre. Potatoes are manured the same as turnips, but the dung is ploughed down in the autumn, and artificial stimulants applied when the potatoes are being planted. Being near

Lossiemouth, where extensive fisheries are carried on, Mr Adam gives his land intended for turnips a liberal top-dressing with fish garbage, which is ploughed down in autumn, and not put into drills as is usually the case. The whole of the farm steading, which was destroyed by fire fully a year ago, has been rebuilt —the proprietor allowing about half the cost, and valuation for the other half at the end of the lease. Mr Adam drained the greater proportion of his farm since 1855. The proprietor afforded pipes for three large open ditches, which have been filled in, and about 30 acres have been reclaimed, for which the tenant gets nothing. The tenant has also erected a steam threshing mill, for which he gets valuation at expiry of lease. The farm stock of cattle consists of crosses and shorthorns, of which about 20 are annually bred and about 40 fed. The feeding stock are tied up in October, and sold off about April or May. Turnips and straw constitute the staple article of food, and about the 1st of February from 2 to 3 lbs. of linseed cake or bruised oats and rye are allowed each animal per day. The average weight when fat is about 6½ cwt. As long as good Irish calves can be got from £5 to £6 when about six months old, Mr Adam thinks it more profitable to buy in than to breed cattle. He keeps a number of cows, and supplies the inhabitants of Lossiemouth and Branderburgh with milk. About 300 half-bred lambs are bought in in August, and kept on grass and stubble fields till December, when they are netted on turnips, and get ½ lb. of linseed cake or corn from the 1st of March down to the 1st of May, when they are sold off. Mr Adam has a good deal of the Clydesdale blood in his stud, and the horses are strong, heavy, and well adapted for to work at the rate of 80 acres per pair. Married servant men are most plentiful where cottages can be got, but these are far too few. Wages have advanced about 30 per cent. since 1857. Two-thirds of the shift are devoted to the growth of swedes and one-third to yellow turnips. On one-fifth of the land under the five-shift system Mr Adam grows oats and one-fifth barley, and in the seven-course shift he grows one-seventh oats and two-sevenths barley. He does not grow wheat, but cultivates a little rye occasionally.

Another large and similarly conducted farm is Muirtown, tenanted by Mr John Calder. It is all arable, extends to 270 acres, and is rented at £331. The whole of the farm is wrought under the five-course shift. The average yield of barley is about 5 quarters per acre, weighing from 56 to 58 lbs. per bushel, and oats 6 quarters per acre, weighing from 42 to 44 lbs. per bushel. Wheat, which is not extensively grown on this farm, weighs from 63 to 64 lbs. per bushel. The soil is mostly of a sandy nature, and well adapted for the cultivation of roots,

especially potatoes. In cleaning the land for the root crop, Mr Calder "break furrows" twice as early in the autumn as possible, after which it receives a thorough grubbing and harrowing. At the time of sowing turnips, from 20 to 22 loads of dung, along with from 5 to 6 cwt. of artificial manure, is given per acre. The potatoes, which are grown generally after lea, get from 7 to 8 cwt. of artificial manure. The houses on this farm are all in good repair. Mr Calder breeds a few calves every year, but only keeps cows sufficient to supply milk for the farm. He feeds from 40 to 50 cattle every winter on cut turnips and straw, and sells them in February and March, when they as a rule weigh from 5 to 7 cwt. He also feeds a few sheep every year, and kills them in the months of March and April. They are fed on turnips and straw. As regards horses, there are few farms in the county on which a better stock can be seen. Mr Calder is a careful breeder, and an excellent judge. His horses work from 70 to 80 acres a pair. Wages are about the same now as those current in 1860, but they were considerably higher a few years ago. From 54 to 55 acres are sown with turnips, one half swedes and the other half yellow; about 55 acres barley, and 45 acres oats. Barley is the most renumerative crop.

Perhaps on no other holding in the parish of Drainie has the condition and value of land been more enhanced than on the farm of Ardivot during the past twelve years. Since the present tenant, Mr George Tod, entered the farm some eleven years ago, he has increased its value considerably over £100. Besides this, Mr Tod has since erected over 15 miles of fencing, and built a farm steading and cottages to the amount of £1400. The same number of acres on the farm return double the quantity of grain and roots yielded prior to 1870. Mr Tod says, "to get land kept up to a high state of cultivation, is a matter of no little importance, and can only be done by compensation, and rooting out those tenants who abuse land, and they are not few. It will not pay any farmer to reduce his land too much, and in order to avoid this let phosphates be applied instead of bones." Mr Tod has reclaimed about 130 acres of the Loch of Spynie, which he partially drained, the proprietor supplying the tiles. It was formerly worth about 5s. per acre, and now it has risen to 25s. or 30s. per acre. He also drained nearly every field on the farm, and filled up a big ditch some 130 chains in length, the proprietor supplying the tiles. The farm is stocked with very superior cattle and horses, and Mr Tod never fails to adopt the proper means for their improvement.

We now find ourselves in the parish of Duffus, which is extremely level and low-lying. Its total area is 9865·270 acres; in 1866-67 its valuation was £12,005, 12s., and in

1832–83, £13,999, 17s. This district has been immensely improved during the past twenty-five years, which has to be ascribed as much to the enthusiasm of the tenantry as to the enterprise of the landlords. Sir Archibald Dunbar, Bart., of Northfield, is the principal proprietor. His estate in round numbers is 2400 acres in extent, of which about 100 acres are under wood. The rental in 1855 was £2995, 9s. 5½d., and in 1880, £3421, 18s. 6d. The land on this estate is chiefly alluvial, but about 250 acres consist of adhesive clay. The size of farms is generally about 130 acres, excepting a few small crofts near the village of Duffus. Some of these crofts have been held by the same families for three generations without lease. Almost all the houses on the estate have been slated and repaired since 1855, and many others built from the foundation. Fencing, which is chiefly wire, has been erected by the tenants, for which they get value before leaving. About 80 acres of the Loch of Spynie have been reclaimed since it was drained, and the land is of an alluvial description, resting on a sandy bottom. The proprietor puts up most of the farm buildings; but in some cases tenants erect cottages, and are paid for them at the end of the lease. Most of the improvements are done by the proprietor. On this estate 50s. per acre is the highest rental, 10s. the lowest, and about 31s. the average. Rents are collected in June and December. None are paid in kind. The increase in the rental of this parish is greatly swallowed up by the increase of public burdens. The taxes and public burdens in 1855 amounted to £556, 18s. 1½d., and in 1880 to £655, 19s. 6d., showing an increase of £99, 1s. 4½d. The estate is well provided with accommodation for the servants. Cottages have recently been built on five farms. Servants are mostly single. Tenants are not strictly bound down to any shift, but the six-shift is followed on all the farms except one. Cattle are principally cross bred, bought in autumn and sold soon after Christmas. There are about a dozen crofts held mostly by tradesmen. About 30 acres have been planted with fir trees since 1855. Sir Archibald Dunbar holds about 50 acres of land in his own hands, adjoining Duffus House, and it is sown out in permanent pasture for sheep.

One of Sir Archibald Dunbar's largest farms is Waterton, occupied by Mr James Young, and is 200 arable acres in extent. In 1866–67 the rental was £300, and now it is £347. Mr Young is a very exemplary farmer, being well acquainted with his profession, both practically and scientifically. He manages other three farms along with his own, viz., Burnside, 280 acres; Covesea, fully 300 acres; and Waterymains, adjoining the farm of Waterton, 230 arable acres. About 140 acres of Burnside are sheep pasture, which is hemmed in on one side by

the sea. Both Waterymains and Covesea are on the Gordonstown estate, and consist chiefly of light arenaceous soil. The soil on the farms of Waterton and Waterymains is mostly adhesive clay, interspersed with rich alluvial and loam. In the district generally the rental averages from 30s. to 35s. per acre. Confining ourselves to the farm of Waterton, we may state that Mr Young pursues the six-shift course, viz., two crops oats and wheat, turnips, barley, and two years grass. Wheat, barley, and oats yield pretty equally, from 4 to 5½ quarters each per acre. A great proportion of the Duffus estate is notable for its crops of hay. On Waterton the average return per acre varies from 200 to 250 stones. Mr Young prepares for the root crop in the ordinary way, and manures land for turnips in spring with a mixture of superphosphates and crushed bones to the extent of from 6 to 8 cwt. per acre. Autumn wheat gets a liberal supply of farmyard manure, and barley is heavily top-dressed with dung in the spring. This produces a fine crop of grass and hay. Potatoes are grown only to the extent required for farm use, and are treated similarly to turnips. Very heavy crops of turnips are grown in this district. The condition of the farm of Waterton, as well as that of neighbouring holdings, has been vastly improved since 1857. Draining, fencing, and squaring up the fields have since then entailed great labour and outlay. A little previous to 1850 and in 1868, the whole of the land on the farm of Waterton was dressed with lime and an admixture of earth at the rate of from 7 to 8 quarters per acre. The farm steading is in excellent repair, having been built about fifteen years ago, and is large and convenient. There are two commodious cattle courts, which are always in use, and which are highly advantageous to the feeding of cattle. The landlord afforded money for the building, and the tenant paid 5 per cent. along with his rent. The cattle are all purchased, and only as many cows are kept as supply milk for home use. Most of the feeding cattle are fed in open courts. They are put on to turnips and straw at the end of September, and some of them are sold off between Martinmas and the New Year, at a weight of from 6 to 7 cwt. each. The further advanced stock in feedng are usually finished off with a little cake. Mr Young has long been an eminent breeder of horses. A pair of horses work only from 50 to 60 acres on this tenacious soil. On Sir Archibald's property farm servants are mostly married. Through the courtesy of Mr Young and the accuracy of his cash book, we are enabled to give a statement as to the total cost of labour at various periods since 1857, on the farm of Waterton. It is as follows :—in 1857, about £75; 1860, £78; 1865, £82; 1870 £95; 1875, £142, 10s.; 1880, £129, 15s.; and in 1881,

£126. Casual labour for hoe and harvest for the past twenty-five years varied from £30 to £40 a year. This indicates pretty clearly the rise of wages since 1857. Mr Young erected farm servants' cottages, for which he is paid by proprietor at the end of the lease. The fallowing of land was abandoned some thirty years ago in this district, when turnips became an established article of food for cattle. Swedes are grown to the extent of two-thirds of the shift, yellow turnips one-third; wheat about 33 acres, barley 33 acres, and oats 33 acres. Wheat, as a rule, pays better than barley or oats. Mr Young, contrary to most of the other farmers in the district, thrashes the bulk of his cereals with a horse mill in wet weather, when the land is unworkable, which keep down expenses that are necessarily involved when portable mills are brought into requisition. The majority of farmers in Duffus thrash out their barley in the fall of the year with portable mills, especially on the drier soils.

A little further westwards are the farms of Surradale, 184 acres in extent, and £500 rental, and Orchardfield, 127 acres, and £240 rental, occupied by Mr James Adam. The farm of Thornhill, 195 acres, and £210, 10s. rental, in the parish of Elgin, was also in possession of Mr Adam. The former two are wrought as one farm, and all the three consist of purely arable land. The Duffus rental runs from 25s. to 35s. and the Thornhill district from 5s. to 25s. per acre. The farms in Duffus contain clay and black loamy soil, and on Thornhill the soil is light and sandy. The Surradale farm yields about 6 quarters of cereals per acre, and Thornhill barely 4 quarters. The quality of the grain on both farms is invariably superior, and weighs over the standard weight. In preparing land for the turnip crop Mr Adam ploughs it in autumn to the depth of 10 inches, and cross ploughs it in spring, and cleans out the weeds thoroughly. He gives it about 25 loads of farm-yard manure and 6 cwt. artificial manure per acre in spring. The land for potatoes is prepared in the same way, and receives about 6 cwt. of manure, consisting of bones, superphosphates, and sulphate of ammonia, per acre, which is sown broadcast on the drills immediately before planting. Great improvements have been accomplished on Surradale by the proprietor during the past twenty-five years. Mr Adam built an addition to the dwelling-house in Thornhill, repaired the farm steading, improved roads and water-courses, and fenced the farm partly with stone dykes and wire entirely at his own expense. Very few cattle are bred on either of these farms, but about 300 are fed every winter. These are chiefly polled and cross cattle, which are housed for feeding about October, fed on turnips and straw with 2 lbs. cake and 2 lbs. oats per day, and are sold off as they fatten. The farm horses have improved greatly

since 1857, and a pair works at the rate of 80 acres. The farm servants are mostly single, and get from £20 to £25 yearly, with the usual allowances. Wages have risen fully 25 per cent. during the past twenty years. There is sufficient cottage accommodation at Surradale, but not at Thornhill. Rents have advanced 30 to 35 per cent. since 1857, and are at present too high.

The parish of Spynie stretches almost due east and west between the parishes of Drainie, Duffus, and Elgin, and has an area of 5971·512 acres. About a mile from the east end of the parish it is intersected by a high ridge of moor, covered with fir wood on the north side, and a flourishing oak wood on the south. On either side of this ridge, as in the eastern half of the parish, there is a deal of fine soil, varying from the richest loam and clay to the most sterile sand. The value and general configuration of the parish have been very much improved since 1850. There has been no noteworthy change in the system of farming, but the soil has been greatly enriched by skilful management. The principal landed proprietor in this parish is Lord Fife, and generally the five-course shift is the system of rotation adopted. The farm of Myreside is one of the largest and best managed farms in the parish, and our notes with reference to it will suffice for giving an indication of the system pursued on the north-east side of the parish of Elgin, as well as for the parish of Spynie. Mr Russell, the tenant, is one of the most successful farmers in Morayshire. His knowledge of the chemistry of agriculture affords him a special prerogative in his profession, which, unfortunately, few agriculturists can boast of. In nourishing exhausted land he has been very successful, and his farm is now raised to a high state of fertility. Its total extent is 360 acres, of which 5 acres are rough pasture. The average rental of the district is from 25s. to 26s. per acre. The soil on this farm ranges from almost pure sand to good loam. The climate is dry and warm. Mr Russell farms under the five-shift rotation, viz., two years grass, white crop, turnips and barley sown out with grass seed; potatoes are substituted for part of the turnip break, or part of the white crop after lea, according to the soil. Irrespective of exceptional years, the average yield of crops on Myreside is, barley 5 quarters per acre, weighing about 56 lbs. per bushel; oats from 4 to 5 quarters, weighing about 43 lbs. per bushel; and rye from 3 to 3½ quarters per acre, weighing about 60 lbs. per bushel. The return of barley in 1881 did not exceed 3 quarters per acre, and was exceptionally light. Mr Russell has not grown wheat for four or five years, the average yield having fallen to 3 quarters on the best land on the farm. Turnips (yellow) yield about 15 tons, and swedes about 18 tons per

acre. Potatoes return on an average 5 tons per acre. The land is ploughed with a strong furrow in autumn, allowed to lie under the action of frost in this condition until spring, when it is cleaned in good time, and left to consolidate and gather moisture for some time before drilling. About 18 loads of dung are given per acre along with from 4 to 6 cwt. of artificial manure, which is composed of dissolved bones and superphosphates. To light land, when farm-yard manure runs short, Mr Russell gives 5 cwt. of crushed bones to an acre. From 8 to 10 acres of potatoes are grown every year. They are sometimes laid down with stable manure alone, sometimes with sulphate of ammonia and potash, and occasionally with bones. The latter is not considered good for potatoes. Since 1855, about 80 acres of land have been improved, 50 acres of which were drained lately at the tenant's expense. The proprietor paid a proportion of the expenses of draining some 15 or 20 acres. Several miles of dyke, new dwelling-house, and an addition to farm steading have been built by the proprietor, for which 5 per cent. interest is payable by the tenant, who supplied building materials. Eight or ten calves are bred yearly, and from 20 to 30 head of three-year-old cattle fed during the winter. They are partly tied up, and partly fed in half-covered courts. The first consignment of fat stock is usually turned out about Christmas, weighing fully 5 cwt. each. Cattle feeding in folds are sometimes kept on yellow turnips for three weeks, then Swedish, with a little corn and cake, until about April, when they weigh from 6½ to 7 cwt. Some years there is more profit in buying in than breeding. Mr Russell bought about 100 half-bred lambs and wintered them up to a few years ago; but although they left a little profit, he has relinquished sheep feeding, and now sells his spare roots. His horses are all good, and work at the rate of 80 acres a pair. Under the heading of labour, we give Mr Russell's statement as to the increase in the rate of wages. Since 1857 rents have risen about 20 per cent. Mr Russell grows about one-third of his turnip land in swedes, two-thirds in yellow turnips, one-fifth barley, and one-fifth oats. Rye is grown on 10 or 15 acres of the poorest soil.

The parish of Elgin is inland, contains 19,258·329 acres, and is very irregular in its shape. Its valuation in 1866–67 was £10,238, 9s., and now it is £11,351, 4s. The nature of the soil is extremely variable, and the climate is generally dry and early. Elgin is situated in the eastern corner of the parish, is 71½ miles from Aberdeen, 178 from Edinburgh; latitude 57° 39′ N., longitude 3° 22′ W. To the south-west of the parish, there is much of the soil fertile loam, and the scenery is magnificent. Five miles south-west of Elgin are the lichen-

clad ruins of Pluscarden Abbey, which was founded by Alexander II., and belonged to the Cistercian order of monks. It may be said that this parish is nearly all under cultivation. The most extensive proprietor is Lord Fife. The properties of the Earl of Moray, Lord Seafield, and the Hon. James Ogilvie Grant of Mayne, all meet in the parish. Having already indicated pretty fully the customs and general management of farms on the Fife estates, we shall proceed to the western district, which is the property of the Earl of Moray, where there are many extensive and skilfully wrought holdings. We will not stop at this stage to describe the Earl of Moray's estate, but will do so when we reach a more central point. Here we are in a beautifully cultivated valley along the western side of the river Lossie, and shall explain the courses of husbandry pursued. The fine and carefully managed farm of Linkwood, in the neighbourhood of Elgin, has an area of 486 acres, is rented at £500, and occupied by Mr Eric Sutherland.

Wester Manbeen is the largest farm in the district, if not indeed in the parish, and is held by Mr James E. Colvin. Its extent is 540 arable acres, and is rented at about 28s. 6d. per acre. This, however, is above the average rental of the district, which runs from 20s. to 25s. per acre. The soil is mostly sandy loam, and being almost on a level with the river Lossie, is inclined to be cold and damp. Though the climate is naturally warm, vegetation is generally a week later than in the neighbouring parish of Alves. The greater part of the farm is worked under a six-course shift, but a part of the best land is laboured in the five-shift rotation. Under the latter system a crop of hay, which yields about 130 stones per acre, is taken, and the grass is depastured the second year. After three-year old grass, which occurs in the six-shift course, about 15 acres of potatoes are raised. The tenant finds it most profitable to grow turnips after potatoes, which saves an amount of labour in cleaning the land. A crop of barley is then taken, which is sown along with grass seeds. Wheat yields on an average 4 quarters, and weighs 62 lbs.; barley 4½ quarters, and weighs 55 lbs.; and oats 5 quarters, and weighs 43 lbs. A quantity of tares or vetches is grown every year, and given to cattle and horses in harvest. In the district generally, as well as on this farm, land when dirty is break furrowed as soon as the foregoing crop is secured in the autumn, and is left in this condition during the winter. This keeps weeds near the surface, and therefore facilitates the cleaning of the ground in spring. Mr Colvin approves of sowing his manure broadcast, as it lies nearer the root of the plants than when sown in the drill. A proportion of the farm-yard manure is given to land for wheat in the autumn. About 70 acres of land for turnips receives from 18

to 20 loads of dung, and before drilling a mixture of manure of ½ cwt. Peruvian guano, 3 cwt. dissolved bones, 1 cwt. superphosphates, and 1½ cwt. bone meal,—in all 7 cwt. is sown per acre broadcast. Fifteen acres of light outlying land never gets dung, but a mixture of artificial manure given instead, consisting of 1 cwt. kainit, 4 cwt. dissolved bones, 2 cwt. bone meal, and 1½ cwt. superphosphates. A covering of farm-yard manure is spread over lea intended for a potato crop in the autumn, and it is then ploughed light. Besides dung, a mixture of 1 cwt. muriate of potash and 2 cwt. dissolved bones is given per acre before planting. The steading of the farm is perhaps second to none in the county, both in respect of size and grandeur, and was designed by Mr William Brown, factor for the Earl of Moray. Its covers fully an acre of ground, and is built in a most useful and convenient form. It has extensive accommodation, is well apportioned, and was built a few years ago by the proprietor. The tenant provided the building material. At his own expense he erected upwards of three miles of substantial wire fencing. From 30 to 40 cross cattle are reared every year, and 100 fed. Those reared on the farm are sold off when 20 months old. They usually weigh about 6½ cwt. each. Turnips and straw form the staple diet until within a few months of the time for disposing, when they receive an allowance of corn and cake. The horses on the farm are strong and good, and about 90 acres are allotted to a pair. Servants are mostly married, cottages being abundant. The ordinary wages for farm servants range from £16 to £30, with 2 loads potatoes, 6 bolls meal, and a supply of milk and coals. They have increased fully 35 per cent., and rents about 15 per cent. since 1857. Under the present circumstances, rents are too high. The acreage under the respective crops are swedes 50, yellow turnips 45, barley 100, and wheat 50. Barley is the most remunerative cereal. Mr Colvin also occupies the farm of Burn of Rothes, which is 240 arable acres, and has attached to it from 8000 to 10,000 acres of hill pasture. It carries a breeding flock of Cheviot ewes, generally numbering about 1800, and also a flock of the blackfaced breed. A Leicester tup is allowed to mix with the latter about the 15th November, and with the former about 20th November. The Cheviot wether lambs are disposed of at the Inverness sheep fair, and the greyfaced lambs are sold off later in the season.

The farm of Easter Manbeen, occupied by Mr Scott, has a total area of 200 acres, and is all arable. The soil on it is mostly light, and both the five and six shifts are adopted.

Another hour's walk, and we reach the parish of Birnie, which stretches along the foot of the subordinate chain of primitive mountain land which divides the upper half of the county

from the "Laigh of Moray." It is 6828·267 acres in extent, had a total rental of £1964, 2s. in 1866–67, and is now £2913, 3s. The real rent of the parish in 1791 was £375 sterling, and in 1835 £1200. A considerable breadth of the extent of the parish consists of hill and moorland, but there are also extensive tracts of highly cultivated soil. The principal object of interest in this parish is the church, which lies near the centre of it, and which is extremely old. No data can be found to indicate when it was built, but it is said to be the original seat of the Bishopric of Moray. The strata or underlying rocks in the parish of Birnie consist of gneiss and Old Red Sandstone. The soil varies from light gravel, through the richest alluvium to retentive clay, and moss in the upper districts. There is such a depth of sandy matter intervening between the strata and the soil, that the rocks do not influence it to any great extent. The principal farm we have yet reached is that of Shankhouse, tenanted by Mr Alexander Grant, and which extends to about 130 acres arable, and 50 acres natural pasture. Mr Grant manages another important holding. The rental per acre in this parish averages from 7s. 6d. to 35s. per acre. The five-course shift is pursued, and crops yield fairly well in good seasons. The land is cleaned in the spring for turnips, and manured in the drills with 20 loads of dung and from 4 to 6 cwt. of artificial manure. For potatoes the land is dunged and ploughed down early in winter, and from 3 to 5 cwt. of potato manure is also added with the seed. Mr Grant drained a considerable extent, subsoiled and fenced a great deal, and the proprietor built all the necessary buildings, and charged 5 per cent. interest, exclusive of the cartage of building material. The steading and farm houses are now in excellent repair. Few cattle are reared. From 25 to 30 cattle are fed in byres and courts. They are tied up in September, when feeding begins with soft varieties of turnips, accompanied by a little bruised oats, then yellow turnips, followed by swedes. Mr Grant allows from 70 to 90 lbs. of turnips to each animal per day, with 1 lb. cake and corn. As they fatten, their supply of turnips is curtailed to 50 lbs. or thereby per day, and artificial stuffs increased to a corresponding extent. In years such as last year, when potatoes are cheap, cattle are fed partly on them. Mr Grant buys in from 70 to 100 cast ewes in the end of the year, to eat up the remainder of the grass, and he feeds them off with turnips and corn. The farm horses are generally good and active. They as well as cattle have greatly improved within the last twenty-five years. Servants' wages had advanced between 1855 and 1878 by about 70 per cent., but have since then decreased about 15 or 20 per cent. Rents rose from 25 to 40 per cent. up to 1878, on an average. They are too high on the majority of farms.

The farm of Shogle extends to 158 acres arable and 40 pasture, is rented at £121, 7s., and is situated near the centre of the parish of Birnie. The soil on this farm and the surrounding districts varies from good sharp soil to cold damp land, in some cases much in want of draining. The average rental per acre is about 16s. Under the five-shift rotation, which is prevalent in the district, oats yield from 4 to 6 quarters per acre, weighing from 41 to 43 lbs. per bushel; barley 5 to 6 quarters, weighing from 53 to 56 lbs.; rye from 3 to 4 quarters, weighing from 58 to 60 lbs.; turnips from 15 to 20 tons per acre, and potatoes from 4 to 5 tons. About 20 loads of dung with 3 cwt. bone dust, 3 cwt. superphosphates, and 1½ cwt. "challenge" manure, is the customary allowance in the shape of manure for turnips. For potatoes, the dung is ploughed down in autumn, and from 4 to 5 cwt. of potato manure is added when planting. The proprietor built a nice commodious steading, and the tenant—Mr Cruickshank—reclaimed about 10 acres of land during the past twenty-five years.

A little further inland is the farm of Blairnhall, which contains 117 acres arable and 100 acres pasture, and is tenanted by Mr Grant, a very careful farmer. The soil is dry, and would not pay the labour if wrought in the five course-shift. Sometimes Mr Grant leaves it in grass for three, four, and five years, then takes a crop of turnips off the worst land, which is succeeded by a crop of barley or rye sown with grass seeds. In medium soil Mr Grant ploughs early, grubs well in spring before sowing, which he usually begins about the 1st of May, taking a crop of barley, then turnips, which is followed by barley again sown with grass seeds. His system on the good land is somewhat different. He takes first a crop of oats, then barley, giving about 3 cwt. manure per acre, which is followed by turnips, and with another crop of barley runs it into grass. Oats yield from 3½ to 5 quarters per acre, weighing from 42 to 45 lbs. per bushel; barley from 4 to 5 quarters, weighing from 54 to 58 lbs. per bushel. Mr Grant gives about 20 loads of dung per acre to land for turnips, along with a mixture of crushed bones, bone dust, and superphosphate, to the amount of 6 cwt. For potatoes he gives dung and about 4 cwt. potato manure per acre. He keeps a flock of Cheviot ewes and a Leicester tup.

In resuming our tour westward, we enter the parish of Alves, which is one of the most notable in the county for its agricultural industry. There are several landed proprietors in this parish, but the most extensive are the Earl of Moray and Lord Fife. The extent of Alves is 9424·686 acres, and in 1866–67 rented £7811, 13s., and in 1882–83, £9084, 18s. It is for a considerable distance washed by the sea on the north side, and the nature of the soil is a free deep productive loam, intersected

by pendicles of moss and sand. The farm of Inchstelly, tenanted by Mr Leitch, gives strong evidence of the skilful way in which farming is carried on in the parish. Inchstelly contains 270 arable acres, and is rented at about 35s. per acre. The soil consists of sandy loam, and the climate is favourable. The five and six course shifts are pursued. Barley is the most profitable cereal, and yields on an average from 4 to 5 quarters per acre, weighing about 56 lbs., and oats from about 6 quarters, weighing about 42 lbs. Not much wheat is grown, but the average weight of it is about 62 lbs. Mr Leitch ploughs land for turnips deep in autumn, and lets it lie in this state till spring, when he cross ploughs, harrows, and grubs it, and harrows it again before sowing. Mr Leitch gives the land about 10 cwt. of bone dust and phosphates per acre, but no farm-yard manure, which is put on the ground after the turnips are lifted, for the following crop of barley. He has always a good crop of turnips. Potatoes are grown in quantities sufficient to meet home requirements, and they are manured in the same way as turnips, except that they are allowed a little farm-yard manure. The tenant has trenched and reclaimed some 30 acres of hill land, and carted away thousands of loads of stones from it. He breeds all his feeding stock of cattle except a very few. They are tied up in early autumn when from 18 to 20 months old, and if worth £18 a head, then he has no difficulty in adding at the rate of £1 a head per month to their value until they are properly fed. They get tares to begin with, when they are newly put in for feeding, then early turnips and straw, with 1 lb. cake each and a little meal. Heifers weigh from 5 to 6 cwt., and stots from 6 to 7½ cwt. when kept to Whitsunday. Mr Leitch thinks farmers should breed more cattle than they do. Each cow fosters two calves. His horses are strong useful animals, about the best in the county, and were bred by himself. He has always a few entire horses, from which he is careful to select the best animals for breeding purposes. Horses have improved greatly during the past twenty-five years, but there is still need for improvement. From 80 to 90 acres are allotted to a pair. Wages have advanced nearly a half since 1855. Cottages are abundant on the Earl of Moray's estate. The rental of this farm has risen £95 since 1850. The general rise throughout the parish would run from 15 to 20 per cent. Mr Leitch grows about 53 acres of turnips, of which two-thirds are Swedish and the rest yellow and early turnips; about 53 acres of barley, 53 acres of oats, from 8 to 10 acres of tares, and from 10 to 15 acres of hay occasionally, which yields from 120 to 150 stones (22 lbs. per stone) per acre.

The estate of Ardgye, the property of Mr Robert Mackessack, covers about 4000 acres, of which about 3000 are arable, 400

under wood, and the rest links. Mr Mackessack is one of the most liberal landlords in the country, which is evidenced by the fact, that when he came into possession of the estate he bought up all the buildings belonging to the tenantry, and has since erected all the necessary buildings without charging interest. As a matter of course, he obtains a slight increase of rent after erecting houses and fences. The soil consists of a black and light sandy loam, and is very friable and productive. The farms on the estate range in size from 10 to 400 acres, and are all well provided with houses. These are, with a few exceptions, built of stone and lime, and roofed with slates. Most of them have been erected during the past twenty-five years. Nearly all the farms on the property have also been fenced and subdivided with wire within that period. There have also been a good many miles of stone dykes built, as well as a considerable stretch of hedging planted since 1857. Roads in the parish of Alves are at present uniformly good, and are carefully kept. Partly by the agency of steam and horse ploughs, the proprietor has during the last three years reclaimed about 300 acres of land, which in its former state was worth only about 1s. per acre, and will soon be worth 20s. per acre. The cost of reclamation is estimated at from £3 to £5 per acre. Mr Mackessack has expended a great deal, and in fact expends a large sum annually, in draining, for which he charges nothing from the tenants. The average rental over the estate is about 30s., and the extremes 40s. and 20s. per acre. The rents are collected at Candlemas and Whitsunday. Servants are in the majority married, which is mainly due to the good supply of cottage accommodation. Generally speaking, the five-shift rotation is the one adopted, but there is no specific stipulation in the lease whereby tenants could be prohibited from deviating from this course. The regulations merely state that the tenant shall be entitled to labour the arable land of the farm during the currency of the lease as he may consider proper, as long as he goes by the rules of good husbandry, providing that he cleans the land well and labours it under the five-shift system during the last three years of his lease. There are a good many tenants on the estate who hold their farms on leases of fifteen years, but nineteen years is the prevailing duration. Cross bred cattle, from shorthorn bull and polled cows, are the predominating breed of cattle, which along with a number of bought-in stock are fed on turnips and straw, which is supplemented with about 3 lbs. of cake per head per day. The only sheep farm on the estate is that of Rosevalley, occupied by the proprietor, on which about 1000 half-bred lambs, bought in the month of August, are fed. The usual allowance of extraneous feeding material is about 1 lb. of cake per head per day. There are only a few small crofts

on the estate, and are held mostly by tradesmen on short leases. During the past fifteen years about 400 acres of partly Scotch fir and larch wood have been planted, which are making rapid progress. Mr Mackessack well knows the exigencies of tenants by being a large farmer himself, as well as a proprietor. He farms from 1500 to 1600 acres of land, and is presently preparing three farms, with buildings, fencing, and drainage, to be ready for letting next season.

Mr Walter Adam, tenant of the farm of Sweethillock, Alves, is also a successful and very enterprising farmer. He farms extensively both in this county and in Banffshire. The farm of Sweethillock extends to 190 acres, of which 3 acres are pasture and the rest arable. It is rented at £180. He works under the six-shift rotation, taking two successive white crops on good land. Wheat used to yield about 5 quarters per acre, but in recent years only 3 quarters; barley about 5 quarters, and weighs about 56 lbs. per bushel. Oats are grown on the worst land, and yield from 4 to 5 quarters per acre. For turnips Mr Adam ploughs in autumn, again in winter, and a third time if the season be good. He gives the land 16 cubic yards of dung, along with 5 cwt. of bone dust and 1½ cwt. superphosphate manure per acre. He grows only about two acres of potatoes, which are similarly treated to turnips. The tenant built a dwelling-house and an excellent steading, as well as stone dykes, without any assistance from the proprietor. He has improved the farm immensely since 1857. Few cattle are bred, but a good many are fattened, and weigh from 5 to 6 cwt. when sold. Sheep are bought in in the end of the year to eat up the grass, and are fed off on corn and cake. Mr Adam has an excellent stud of horses, but he says there is great need for good stallions to travel the county. His horses work at the rate of 70 acres a pair. Servants' wages have about doubled since 1855. Cottages are scarce, and proprietors should provide these for tenants. Rents have advanced about one-fifth over the county generally, since 1850. The system of farming has changed greatly in this district. With efficient drainage, liberal manuring and liming, the land will now raise double the quantity of grain that it would have done twenty-five years ago.

In the western side of the parish is situated the extensive and excellent farms of Earnside and East Grange, which are occupied by Mr James Mackessack, and which combined make a total of 730 acres of arable land, and are rented at nearly £1000 a year. East Grange is in the parish of Kinloss, but is very convenient to work along with the other farm. The western side of the parish of Alves contains much fine soil, and the rental runs from £1 to £2 per acre. These farms consist chiefly of black loam, and are wrought under the five-shift rotation.

All kinds of crops yield a little above the standard, and more particularly in weight. Land for turnips is ploughed down and prepared in the ordinary way, and from 20 to 25 tons of dung and from 6 to 10 cwts. of artificial manure, chiefly composed of bone meal, superphosphates, with a little Peruvian guano, are allowed per acre. This kind of artificial ingredients is found to stimulate the growth of grass, and give a vigorous start to turnip plants. Mr Mackessack sows about 4 lbs. of Swedish seed per acre, and about 2 lbs. of yellow seed. He has seldom any trouble in getting a good strong braird. To sow Swedish plants thick helps to ward off the "fly." In manuring land for potatoes, Mr Mackessack gives a liberal supply of both farm-yard and artificial manures, and plants potatoes at the rate of from 14 to 18 cwt. per acre. About 10 acres are grown, and if the seed is big a ton is required to plant an acre. He takes a crop of turnips after potatoes. The tenant has drained a considerable extent of land over and over again since 1857. On some parts of Earnside he cannot get drains cut deeper than 18 inches, but they are generally about 4 feet deep. About £30 a year is required to keep them in repair. Within the past twenty-five years Mr Mackessack has greatly enhanced the value of his land. He put on clay and sandy matter at the rate of from 60 to 300 loads per acre on about 40 acres of moss soil. On some parts he spread it over to the depth of 6 inches. To the superiority of Mr Mackessack's black polled herd we shall afterwards advert. Here some reference to his skilful management in his commercial herd may not be out of place. A few years ago Mr Mackessack made a feeding experiment by selecting 24 cattle as nearly one size and age as possible, put 12 of them into one court and 12 of them into another. Besides their every day supply of turnips and straw, he began giving 1 lb. of cake each to those in one fold, and gradually increased it to 2 lbs. and 3 lbs. each per day; while those in the other fold received 1 lb. of oats and bran with a little chaff mixed, from the same day as those fed on cake, and gradually increased to 2 and 3 lbs. per head. In the month of April Mr Mackessack got some of his neighbouring farmers, who are competent to judge pretty accurately, to give their opinion as to the difference in the valuation of the two lots. The lot which were fed on oats, bran, and chaff was worth more than the other lot, at any rate by £2 per head. Mr Mackessack gives all his feeding stock at least 1 lb. of cake per day. He has usually about 200 cattle in his possession—that is, 100 on each farm. He deals pretty extensively in commercial stock, and he estimates his yearly "turn over" to be from £7000 to £8000 in the cattle trade. East Grange is by far the best farm for feeding purposes, and usually most cattle are fed there. They are generally from 6 to 8 cwt.

in weight before he sells them. He has excellent steadings on both farms, being commodious and very substantial. His stock of horses will compare favourably with those of almost any other farm in the county. They are strong, young, and active. Nearly all of them are prize winners, and during the past six years they have gained many valuable cups and medals. He keeps from 300 to 400 sheep during the winter, and fattens them and sells them off before April. Twenty-five years ago, Mr Mackessack paid seven guineas to his grieve in the half year, and now he pays about twice that sum. First and second horsemen had from £4 to £5, and women from £2 to £3 per half-year. Wages have increased a half since 1857. Rents since then have advanced 20 per cent., and are now too high. Swedes are grown on two-thirds of the shift, yellow turnips on one-third; one shift partly in oats and wheat, and one shift barley.

The estate of the Earl of Moray extends to about 22,000 acres in Morayshire and 300 acres in Nairnshire. Of these, there are from 6000 to 7000 acres under wood and about 6000 acres under pasture. The rental in 1866–67 was about £8868, and is now £10,000. Few proprietors are more generous and enterprising in giving facilities to their tenantry for the promotion of agricultural industry, or for getting the full benefit of the resources of the soil. He has given all possible encouragement for the advancement and improvement of agriculture in all its branches. Mr Brown, factor on the estate, designed the new cottages and farm steadings, not forgetting to mention that it was he who planned the magnificent farm steading of Wester Manbeen, which covers, as already stated, about an acre of land, and which is unexampled alike for its suitability for the farm and its great convenience, in these two counties. The varieties of soil throughout the estate are light, friable, upon gravelly subsoil, clay, loam, some moss, and sandy and gravelly soils. The holdings over the estate are irregular in size, ranging from 70 to nearly 600 acres. The farm houses are, as a rule, in excellent repair. During the past twenty-five years, a large number of excellent cottages, farm steadings, and dwelling houses have been erected, and many repaired. Nearly all the wire fencing is performed by the tenants. A considerable mileage of dykes have been built by the proprietor, which are usually about 4 feet 9 inches in height. The principal fences consist of wire. Both public and private roads within the estate are in good order. There has been a considerable extent of land reclaimed since 1857, and the greater part of the improvements in this way have been effected by the tenants; chiefly small patches in squaring up fields and completing shifts. These reclamations have generally been profitable to both landlord and tenant. The soil over the property being generally

light, comparatively few drains are required, and these have been executed by the proprietor and tenant. With the customary conditions of exit and entry—entry at Whitsunday—the duration of lease is nineteen years. Crofters hold their land from year to year. The building operations are wholly done by the proprietor, and additions to houses are mostly made at the beginning of the lease. Courts for feeding cattle are built with close roofs, those for store or young stock being about three-fourths covered. On most farms there are two courts. The extremes in the rental are about 10s. and £2, 5s. Rents are all paid in money at Candlemas and Lammas after reaping the crop. The majority of the farm servants on the estate are single, but they are being well provided with neat superior cottages, and married men are becoming more numerous every year. The favourite breed of cattle among the Earl of Moray's tenantry is cross, but there are a few pure bred animals on several farms. For feeding purposes lots of cattle are bought in, and in fact the majority of the feeding stock in the lower districts are purchased from the south and more inland parts, where the breeding of cattle constitutes a more important branch of the farming husbandry. The first fat cattle are usually marketable about Christmas, aud herds continue to be reduced until the end of spring, by which time the feeding stock is cleared out. In many cases the cattle receive, some weeks before sending off, from 2 to 4 lbs. of cake per day. The prevailing system of rotation is the five-shift course, but a few farms are worked on the six-shift course, as it is found to mitigate the loss by finger-and-toe amongst turnips. There are two sheep farms on the estate, viz., Braemoray and Broadshaw, where the pasture is a mixture of grass and heather. On these farms the blackfaced breed of sheep are kept. Crofters number about twelve, whose crofts vary in size from 4 to 8 and 10 acres. They are mostly day labourers. About 100 acres of wood have been planted on the estate since 1857. Mr Brown, factor for the Earl of Moray, is tenant of the farm of Earlsmill.

The estates of Westfield and Hythehill, the property of Mr Hugh M'Lean, consists of 562 arable acres, 15 acres borders of roads, and 68 acres of wood, or in all, 649 acres. The total rental in 1862 was £1208, 10s., and is now £1140. The nature of the soil on these estates varies from sandy loam to clayey loam, and what is known as Moray clay. The size of the farms on the property is 259, 121, and 184 acres respectively. On all these farms steadings have been rebuilt, since 1862, at the sole expense of the owner. The estate is well provided with hedge and wire fences. Both public and private roads are in good order. There have been no reclamations effected over the property during the past twenty-five years, but the estate has

been drained by the owner since 1862. Like on most other estates, the duration of lease is nineteen years, with entry at Whitsunday on the usual conditions. Building and fencing is executed by the landlord, and maintained by the tenant. Half the cost of maintaining drains, cleaning ditches, painting wood, and fire insurance, is paid by the landlord, and the other half by the tenant. The average rental per acre throughout the property is about 40s. Rents are paid in money at Candlemas and Lammas. In regard to farm servants, grieves, cattlemen, shepherds, and foremen are mostly married, while the younger horsemen are single. Three cottages were erected prior to 1862, while eight have been built since then. The five-shift course has been pursued over the estate for many years. More cattle are purchased by the tenantry than are bred, and the prevailing breeds are crosses and black polled cattle. They are chiefly bought when three-quarters old and sold as two-year-olds. They are partly fed in stalls and partly loose in courts. A good deal of cake is used by some farmers. A flock of half-bred sheep were kept on the estate till recently, but none are now kept. There are no crofts on the property. The home farm is about 250 acres in extent.

In our progress westwards, we next come to the estates of Kinloss and Seapark, the property of Mrs Phœbe Dunbar Dunbar, on which stands the time-honoured ruins of Kinloss Abbey, both in the parish of Kinloss. The former of these is about 103 acres or thereby in extent. Mrs Dunbar has also a lease of the farm of Whiteinch, adjoining the Seapark estate, for which she pays a rent of £132 to Mr Munro Ferguson of Novar and Muirton. Seapark consists of policies round the mansion house, extending to about 12 acres. Mrs Dunbar Dunbar and her husband Mr Edward Dunbar Dunbar are, jointly, owners of the estate of Glen Rothes, in the parish of Rothes, extending to 2500 acres. Great improvements have been made on both Kinloss and Glen Rothes estates during the past fifteen years, in erecting new buildings, and in fencing, draining, reclaiming, and planting. On the Glen Rothes estate, in particular, the farm buildings are almost all new, and have been built in the most modern and approved styles. The farm of Pitcraigie, on this property, has been subdivided with stone dykes and wire fencing, and in doing so it was found necessary to make a considerable length of good roads. In the construction of these about £350 were spent. About 2200 yards of dykes have been carefully built, with a nice taper towards the top, and are firmly coped and pointed with lime. On this farm 15 acres of land have been thoroughly drained. The drains were laid with pipes at the depth of 3 feet 6 inches. Above these pipes a slight covering of earth was first put on, followed by a covering of

about one foot deep of 3-inch broken metal, and then the final covering of soil, the object in putting the layer of broken metal being to facilitate the absorption of surface water. This is done only where the land is stiff and retentive. The drains were cut 6 yards apart. About 8000 yards of fencing, 4 feet high, and with six wires,—the lower three being No. 7 and the upper three No. 6 wire,—have also been erected on the farm of Pitcraigie, and it is now securely fenced. The duration of lease is nineteen years, with entry at Whitsunday, on conditions similar to those of the Earl of Seafield's estates. It may be mentioned, that with regard to building during the currency of the lease, the tenants pay 5 per cent. of interest. A flock of 300 Cheviots is kept upon the farm of Pitcraigie, and the ewes are crossed with a Leicester tup, the lambs being usually sold for delivery at 12th August, when they bring from 24s. to 30s. each. A few years ago a very excellent sheep cot, with lambing sheds, wool store, and shepherds house attached, was built. This is one of the most useful and convenient buildings on the estate. Over this property the six-course shift is pursued, with three grasses. On the farms of Pitcraigie and Barluack, both of which are occupied by Mr and Mrs Dunbar, cattle have been coming more into favour for the past four years. On the former, about ten calves are annually reared from cross bred cows and black polled bull; and on the latter holding, which is 140 acres in extent, about 20 animals are annually fed, and ten yearlings are kept in open courts. Mrs Dunbar Dunbar only bought the farm of Barluack about three years ago, from the Earl of Seafield, and since then 26 acres of it have been drained, and about 2900 yards of wire fencing erected. It is presently in the course of being limed, at the rate of 8 bolls per acre. On the Glen Rothes estate about 100 acres of land have been planted with fir during the past twenty years. Mr H. M. S. Mackay, Elgin, has been factor on these estates for about five years, and during that time many of the improvements mentioned have been carried out by his directions.

To the south of the Kinloss estate, lies that of Burgie, the property of the trustees of the late Mr Robert Tulloch (for which Mr H. M. S. Mackay, Elgin, is factor). It is wholly in the parish of Rafford, and is 2600 imperial acres in extent. Of these, 1290 acres are arable, 800 pasture, and 510 under wood. The total valuation of the estate in 1866–67 was £1166, 5s., and in 1881, £1445. Part of the land is a sandy loam on an open subsoil, and part consists of a sharp gravelly and cold retentive soil resting on a stratum of clay. The farms vary in extent from 40 to 410 arable acres. On the larger holdings the farm houses are in excellent order, while those on the smaller farms are in tenantable condition. The roads are uniformly good, and suitable for

the traffic. By trench ploughing during the last twenty-five years, about 100 acres of pasture and moor land, which was worth originally 1s. per acre, on the hill of Burgie, have been reclaimed, and are now worth from 8s. to 12s. 6d. per acre. About 80 acres also reclaimed on the Burgie Lodge farm, and of these about four-fifths have been ploughed and one-fifth trenched. The cost of reclamation is estimated at from £5 to £20 per acre, which was paid by the tenant. An enterprising tenant improved about 40 acres on Burgie Hill, and for £50 sublet his holding, for which he only paid £20. The other improvements effected, apart from reclamation of land, have been chiefly in squaring up farms and repairing drains. The duration of lease, as on most other estates, is nineteen years, with entry at Whitsunday to houses, grass, and fallow, and at the separation of the crop of that year from the ground to the land under crop. The terms of removal, as regards the garden and green crop, fix the 1st of May as the day of exit. If buildings be executed by the tenants at their own expense, they are kept n repair by the trustees, by way of recompensating these tenants for the labour and expense incurred in erecting the houses. For instance, in the year 1866, three leases expired, and the tenants had claims for meliorations for improvements effected during the currency of their leases, which instead of being paid to the tenants, the proprietors relet the farms to the same tenants at such rents as to wipe off all their claims. In the case of a large farm, the lease of which expired in 1868, when the tenant had a claim for about £1400, the same course of remuneration was adopted. The average rent over the estate is 21s. per acre; the lowest 7s., and the highest 36s. Rents are paid partly at Candlemas and Lammas, after the ingathering of the crop, and partly at Whitsunday and Martinmas. Cottages are numerous, and a good many of the farms servants are married. On light and loamy soils the farms are divided as nearly as possible into five and six shifts of equal size, at the beginning of the lease, and the tenant then follows out a regular system by either of these courses. The rules are these—"The five-shift shall consist of, first year, green crop; second year, white or corn crop laid down with grass; third, hay to be cut once only and then pastured; fourth, second year's grass; and fifth, white or corn crop." The six-shift system is the same as that of the five-shift, except that there are three years' grass instead of two. The cattle on the Burgie Lodge farm, tenanted by Mr R. J. Mackay, are pure bred shorthorns, but generally throughout the estate a cross breed of cattle between a black polled bull and cross cows prevail. Most of the cattle fed are sold fat, when two and a half years' old. Mr Mackay's pure bred herd of shorthorns

originally sprung from the Spynie and Inchbroom stocks, and with judicious purchases, when a chance of obtaining good blood occurred, he gradually improved his stock, and was in possession of a very superior herd before it was disposed on 18th October 1882. One of his best and most remunerative purchases was that of cattle which were obtained from the far-famed Peepy herd in England, where he also secured from other famous sources other animals of considerable merit. There are no sheep farms on the estate, and there are only two crofters, one of whom is a labourer and the other an old residenter. At least 100 acres of pasture and moor have been planted since 1850.

Resuming our westward journey, we enter the parish of Forres, which has a total area of 5963·370 acres. The rental in 1866–67 was £5831, 18s., and in 1881–82, £7840, 7s. The parish is triangular in form, and contains great diversity of soil. In the lower half rich highly cultivated alluvium abounds, and is superincumbent on a rich gravelly subsoil. About the centre of the parish there is a good deal of sandy soil, while in the upper district it varies from poor sand to light loam. It is as a whole highly productive when well managed. Mr Fraser occupies two farms—Netherton and Greeshop, in this parish, and Woodside, in the parish of Kinloss. The former extends to 220 acres arable, with a few acres pasture. The soil is of a clayey nature resting on a subsoil of gravel. It is a fair depth on about 140 acres, and on the remainder, which stands on a distinctly lower level, is very shallow. The six-shift course is pursued on the best land, but the poor land is worked separately. The farm of Greeshop covers an area of 115 arable acres. The soil on it is alluvial, and about four-fifths of it fair in depth. It is wrought on the same system as Netherton, except that potatoes follow grass, and then wheat. The two farms may, for the sake of brevity, be described together. Land is kept four years in grass, then turnips, and next oats sown out with grass seeds. When the season is not too dry, good crops of both oats and turnips are obtained. On good land, two grasses are taken, followed by wheat, which is laid down with a mixture of manure from the burgh of Forres and farm-yard manure. Land for potatoes is dunged before ploughing in autumn, and when planting, guano, muriate of potash, and dissolved bones to the value of 70s. are given per acre, which is sown broadcast on the drills. The next crop is turnips, and by the liberal treatment which the land has received with the two previous crops, 4 cwt. per acre dissolved bones, along with farm-yard manure, produce a full crop. Barley sown with grass seeds finishes the rotation. Mr Fraser has renewed his lease of Greeshop, and no particular rotation has been specified. Both farms were

wrought with a pair fewer horses previous to the potato culture, but since then three pairs are required on Netherton and two pairs on Greeshop. Nearly all the grass on the poor land is eaten by sheep, and the turnips all consumed on the farm. Mr Fraser rears no cattle, but buys his stock when yearlings, and sells them off when fat, weighing from 5 to 7 cwt. On Greeshop the only stock of cattle is about 30 dairy cows. They consume grass, turnips, and other food during the winter, to the value of about 60s. each. They are principally Ayrshire and cross bred cows, bought in newly calved and sold off fat. They are fattened partly in courts and partly in stalls. Byre feeding is generally preferred to that of court. Cattle are seldom fed off without something additional to turnips and straw. Some grain and a good deal cake are used, but two or three months of extraneous feeding is found to be long enough to pay, and if it is used beyond this period the allowance must be reduced. The farm is in the immediate vicinity of Forres, and the milk is called for.

Rents in the western part of the county vary from 20s. to 60s. per imperial acre, and the average stands between 30s. and 40s. Every acre of first-class land costs the tenant about 50s. Rents have been gradually creeping up, and they are now from 25 to 30 per cent. higher than they were twenty five-years ago. This district has, perhaps owing to its low rainfall and open subsoil, suffered less from the past wet seasons than the rest of the country, but notwithstanding, farming has not been paying. The district is pretty equally divided between the five and six shifts' rotation. Though the rotations in the western part of the county are prescribed in the lease, deviations occur, but are generally overlooked. There was one case, however, in the neighbourhood of Netherton, where a tenant had to leave his farm for miscropping. The average returns of the various crops on these farms, and of the district generally, are barley and oats about 5 quarters per acre, wheat 4 quarters. Barley in exceptional cases yields as much as 7 quarters, and wheat 6 quarters per acre. Turnips yield from 15 to 20 tons per acre; potatoes about 5 tons, though 7, 8, and 10 tons are not unknown. Less wheat has been grown in late years than formerly. Barley is often substituted for wheat after lea. It does not, however, suit well, being more liable to lodge after grass than after green crop; besides, barley twice in one shift does not suit. A good many potatoes have been grown in recent years, but the price has been so low for the past two seasons that the acreage is very likely to be greatly reduced. Potatoes will barely pay the producer at 50s. per ton. Three conditions are essential to the successful cultivation of potatoes on a large scale, and these are—first, an abundant supply of dung within a reasonable distance; secondly,

a good command of labour; and thirdly, proximity to a railway station. A number of half-bred and greyfaced lambs are usually bought in in the end of the year, and fed off during the following spring and summer. Those intended to be fattened for market in spring require to be well kept, and receive a liberal allowance of cake and corn each per day. The Clydesdale is the favourite breed of horses. They have improved much during the past twenty-five years, and there is at present a good class of horses in the district. Seventy acres is the ordinary allotment to a pair of horses, but this is regulated by the system of cropping and size of the farm. Farm servants are mostly single, but there is a great want of labourers' cottages. Wages have fallen to the extent of about £5 per year for the past few years. When the present depression set in, they stood about 33 per cent. higher than they did twenty years ago.

The farm of Woodside, 118 acres in extent, in the parish of Kinloss, is also in the possession of Mr Fraser. The soil on it is various, and altogether of secondary quality, including stiff clay, moss, and vegetable mould, all resting on sand which crops up here and there. It is wrought under the six-shift rotation, viz., three grasses, oats, turnips, and barley. The turnip crop gets all the dung made on the farm, along with about 4 cwt. dissolved bones per acre, which is all the extraneous manure used on the farm. Owing to the three years' grass, very fair crops are raised. Part of the turnips and all the grass is consumed by sheep, and only one pair of horses are kept.

Perhaps the largest farm and one of the most skilfully managed in this parish is that of Balnaferry, occupied by Mr John Mackessack. It contains 500 arable and 100 acres pasture, for which the actual rent is £762. The extremes in the rental for ordinary soil in this part of the parish is £1 and £3. Some cowfeeders in Forres pay as high as £5 and £6 per acre. The greater part of the soil on Balnaferry is kindly black loam with gravelly subsoil. The five-course shift is pursued by the majority of farmers, but the six-course system is also followed. On the best land wheat yields about 5 quarters, barley 6 quarters, and oats 6 quarters per acre. In a good year wheat weighs 65 lbs., barley 56 lbs., oats from 42 to 44 lbs. per bushel. It is chiefly chevalier barley that is grown in Morayshire. After going through the ordinary course of preparation of land for roots, Mr Mackessack gives from 20 to 25 loads dung, with 3 to 4 cwt. bone meal, 1 cwt. Peruvian guano, and 1 cwt. superphosphate per acre. Potatoes are planted in the end of March, and manured the same as turnips. During the past twenty-five or twenty-six years Mr Mackessack has reclaimed

about 200 acres of land from whins and heather, and now he pays more than double the former rent. The proprietor gave a small allowance for about one-half of this extent. In addition, Mr Mackessack built several cattle courts, and put up a deal of fencing, without any assistance from the proprietor. He breeds few cattle, but feeds about 100 principally in folds. They are fed chiefly on turnips and straw, with 2 lbs. of cake each per day, and before selling off the cake is increased to 4 lbs. with sometimes a little meal. They usually weigh from 5 to 8 cwt. when fat. From 300 to 600 cross-bred sheep are reared from the Cheviots and Leicesters. The lambs are fed on turnips and hay, with about ½ lb. each of cake per day. Part of them are kept till the grass season arrives, when they are fed on grass and cake. There is a good stock of horses on the farm, and these are calculated to work from 60 to 100 acres a pair. Wages have advanced fully a third since 1857. Cottages are not abundant. Rents have risen about 20 or 25 per cent. during the past twenty-five years.

Towards the upper end of this parish there are not a few well-managed farms. The farm of Mundole is about 200 acres in extent, of which 20 acres are pasture. The rental in this district ranges from 20s. to 50s., and in exceptional cases 60s. per acre. Three-fourths of Mundole is black mould and sand, on gravelly subsoil. The six-course shift is pursued, viz., two grasses, wheat, oats, turnips, and then barley sown out with grass. Wheat when sown from 1st to 15th October yields well, and so also do oats, but not barley. After preparing land for turnips in the usual way, Mr Anderson, tenant, allows from 15 to 20 loads of dung and 4 cwt. superphosphates, and 2 cwt. small bones per acre, over the whole turnip field. Potatoes get court-manure as far as it will distribute, and when it falls short 5 cwt. of kainit is given per acre, along with 3 cwt. small bones. Mr Anderson has reclaimed about 15 acres since Whitsunday 1876, when he entered upon the management of the farm. He also built the greater part of the farm steading, repaired the dwelling house, made new stackyard, erected dykes and wire fencing, which involved an expenditure of over £600. From 15 to 20 cross bred and polled cattle are reared every year and about 30 fattened. They are tied up for feeding about the 1st of October, and are fed on turnips, straw, cake, and sometimes a little corn. When fat they usually weigh about 6 cwt., and bring from £20 to £24 each. Five years ago, Mr Anderson sold one-year-old cattle, for which he received £16 and £17 a head, but last year for similar animals he got only £13 each. Mr Anderson has a fair stud of farm horses, which work at the rate of 60 acres a pair. He thrashes all his crop with them except barley, and drives about 200 loads of dung from Furres every spring. He breeds two

foals every year. The only noteworthy changes in the system of farming since 1857, are that more potatoes are now planted, and less wheat and more barley sown. The only desirable change, says Mr Anderson, is "three years' grass pastured on most of the land at least once in a lease, and to labour the different qualities of soil on a farm, when practicable, on a rotation suitable to each if allowed to do so." He grows about 30 acres of turnips, the half of which is Swedish and the other half yellow, except on lightish soil, when he grows two-thirds yellow and only one-third Swedish, and about 30 acres respectively of oats, barley, and wheat annually.

The parish of Dallas, having a total area of 23,024·823 acres ranks fourth in Morayshire, and showed a rental of £4873, 15s. in 1866–67 and now reaches a valuation of £5493, 4s. There is a great extent of fine friable soil in this parish, and it is presently in a high state of cultivation. It is beautifully diversified with rising grounds and level straths of great fertility The climate is as a rule slightly cold, but nevertheless luxuriant crops are generally obtained. One of the largest holdings in the parish is Mains of Edinvail, which is 270 acres arable and 55 pasture in extent. The tenant holds two farms. The rental in the district generally ranges from £1 to £1, 10s. per acre. The soil varies from black loam to gravel. The tenant adopts the seven-course shift, viz., two crops oats after lea, turnips and potatoes, and barley followed by three years' grass. On the other farm the six-course is pursued, viz., two crops oats, turnips and potatoes, and barleys followed by two grasses. Crops vary in their yielding according to the season. In 1880 the lea crop averaged 5½ quarters per acre, weighed 42 lbs.; barley 4 quarters per acre, weighed 55 lbs.; and potatoes 4½ tons per acre. In 1881 the yield per acre was at least 1 quarter less than that of 1880, and the grain was about 3 lbs. lighter per bushel. The general system of cleaning land in this parish is much the same as we have already described. The land is ploughed 8 inches deep in autumn, and it is also ploughed, grubbed, and harrowed repeatedly in spring. It receives as manure 24 loads of dung and 5½ cwt. dissolved bones per acre. For potatoes the land gets a similar quantity of dung and 5 cwt. dissolved bones. Since the present tenant of Mains of Edinvail entered in 1870, he has effected great improvements in clearing away foundations of old houses, and cultivating the land. The proprietor built a large proportion of the dykes on the farm, and trenched 6 acres of reclaimable land. Sixteen cows are kept on the farm, which foster 24 calves every year. Fourteen cattle are tied up for feeding purposes in October, are fed on cut swedes, potatoes, bruised corn and oilcake, and are sold away mostly in March, weighing from 5 to 6 cwt. each. The horses are good, and 67

acres are allotted to a pair. Servants are mostly single. Men get from £8 to £12, women from £3 to £5, boys from £3 to £5 per half year, exclusive of board. Oats are the most remunerative cereal.

We have now reached the western side of the county of Moray, where the combined parishes of Dyke and Moy, which were united in 1618, forms the connecting link beween Moray and Nairn, and which stretches for a considerable distance on both sides of the dividing line. Before going on to notice the system of farming pursued in this parish, we may mention the principal objects of historical interest. Darnaway Castle, which is said to have been built by Thomas, Earl of Moray, is a magnificent oblong building of great antiquity, and is notable for an ancient hall of extraordinary dimensions, forming the back wing of the castle, which is the summer residence of the present Earl of Moray. The hall measures 100 feet long, 40 feet wide, and about 90 feet high. Brodie Castle, the residence of Brodie of Brodie, is built in an old English castellated style, and is also notable for its antiquity. It is only a few miles west of Forres, and is surrounded by clumps of trees and lovely pleasure grounds. Perhaps the most interesting object is Macbeth's Hillock, or the "blasted heath." It is said to have been the scene of Macbeth's meeting with the three weird sisters of Forres, while he and Banquo journeyed from the Western Islands to meet King Duncan at Forres.

The extent of the parish is 15,463·911 imperial acres, and rental £7728, 8s. in 1866–67; its present valuation is £8944, 15s. The largest estate within the parish is that of Brodie of Brodie. There are also a few less extensive properties. On Mrs Ann Chadwick or Grant's property, Earnhill is the largest and one of the most skilfully worked farms. It extends to 280 acres arable, and about 120 acres pasture. The rental of the farm was £542 in 1866–67, and the present rent is £630. Mr Richard Harris, the present tenant, has occupied this farm for about thirty years, and is a distinguished agriculturist. The land of the farm consists of good loam and light sandy soil. Mr Harris breeds a few cattle, but feeds a good many more than he rears. He also breeds a small flock of Leicester sheep, and buys in sheep to feed. The course of husbandry pursued on the farm is the six-course shift, viz., two grasses, followed by two corn crops, a green crop, and then barley sown with grass seeds. This system prevails on good lands. Mr Harris grows a few mangolds occasionally, and uses a great deal of artificial feeding material both for cattle and sheep. The cost of labour has risen greatly during the past twenty-five years, but it has fallen considerably since 1878. A ploughman gets from £15 to £16, with a house and rations, in the half year. For turnip hoeing, hay-

making, and harvesting, there is difficulty in procuring casual labourers. Mr Harris thinks that improvements might be divided into two classes—firstly, fences, buildings, drains; and secondly, manures. With regard to houses, fences, and drains, Mr Harris thinks it highly desirable that the landlords should provide them all, so as to free the tenant's capital for the working of the land. He put in a lot of drains some twenty-five years ago, at the depth of 4 feet, which are still working well. The custom, in event of a tenant leaving on this estate is that the outgoing tenant is paid for the waygoing crop, and when leaving at Whitsunday is paid for the labour in preparing the land for the turnips. As far as manuring is concerned, he gets a crop wherever he has manured. The average rent of wheat-growing land is about £2 per acre. Mr Harris grows wheat every year, which weighs from 62 lbs. to 66 lbs. in good years. Day labourers get about 3s. per day, and from 18s. to 25s. is spent in labouring each acre. First horsemen get about £30 a year in money and £8, 10s. in kind. Mr Harris's total amount of poors rates is £16, 14s. 8d., of which the landlord pays the half: he pays £7, 5s. for education rate, and £9, 16s. 11d. for road taxation.

The farm of Wester Moy, tenanted by Mr William MacDonald, is very carefully and judiciously managed. Mr MacDonald can boast of one of the most compact farm steadings and of one of the best kept holdings in the north of Scotland. The farm is all arable, and is 135 acres in extent. The rental is at present £306. The rental of the district runs from 32s. to 35s. per acre. The soil is good, and the climate favourable. Mr MacDonald adopts the six-shift rotation. The average yield of wheat is 5 quarters per acre, weighing 63 lbs. per bushel; barley 5 quarters 4 bushels, weighing 56 lbs.; oats 6 quarters per acre, weighing 43 lbs. After preparing land for roots in the usual way, drills are opened 26 inches wide with a double plough. From 3 to 4 lbs. of seed is given per acre, and in singling plants are left from 10 to 11 inches apart. The manure applied is 20 loads of dung, 1½ cwt. of bone meal, 2 cwt. Peruvian guano, and 4½ cwt. of best dissolved bones per acre. The estimated cost of laying down an acre of turnips is £7. Finger-and-toe sometimes proves ruinous to turnips, and especially on soil lying on a clay bottom. Mr MacDonald has greatly improved the drainage of his farm during the past twenty-five years. He has levelled many open ditches, for which he used pipes from 6 to 9 inches in diameter. In the ordinary drains, pipes from 3 to 4 inches in diameter were used. During the past twenty-five years the proprietor laid out from £900 to £1000 in extending and improving the dwelling house, and about £300 in erecting a double cottage for two married servants. Mr MacDonald has

improved the farm steading very much on his own account, mostly in the way of providing accommodation for a steam threshing mill. He breeds from 6 to 8 calves every year, and feeds from 22 to 24 cattle in covered courts. They are taken in for feeding in the middle of October, and sold fat, weighing from 8 to 9 cwt. and sometimes more, during spring months. Yellow turnips and straw, with 2½ lbs. of linseed cake per animal, constitute the staple food for the first few weeks. In course of time swedes are given, and an increased allowance of cake, say 3 to 3½ lbs. each, per day. The tenant finds that polled cattle fatten more equally than when mixed with horned animals, because they are more settled, and agree better about their food. His Clydesdale horses are extremely good, strong, and active. He has three men boarded in the kitchen, who get from £12 to £16 in the half year. Wages have more than doubled since 1857. Mr MacDonald says—"I see more potatoes grown and more low priced phosphates used than formerly, which I have no doubt is one reason why the land is not producing so much good grain and strong stiff straw as it used to do. If we could afford to pasture our grass land for three years, and use more bones and bone meal, we would doubtless manage to restore the grain-producing properties of the soil." Twenty-one acres swedes and 5 acres yellow turnips, 25 acres wheat, 25 acres barley, 21 acres oats, 2 acres potatoes, and 2 acres tares, are the usual proportions of the various crops grown.

The farm of Feddan is 200 imperial acres in extent of arable land, and 178 acres of wood and pasture. The soil is generally light, with a gravelly bottom and an occasional patch of pan. The tenant, Mr Brown, is bound to the five-shift rotation. Barley, which is the most remunerative cereal, yields from 4 to 5½ quarters. Oats return a similar quantity. Mr Brown ploughs land for turnips 9 inches deep in autumn, if the subsoil will allow it, which he leaves unharrowed till spring. After it is harrowed in spring he leaves it at least ten days. This he considers of great importance, because the more the surface is exposed he finds that it absorbs the ammonia better with which the atmosphere is charged. Drills are formed 28 inches wide for swedes and 27 for yellow turnips. Fifteen cubic yards of well-made farm-yard manure is spread in the drill, to which is added 2 cwt. dissolved bones, 2 cwt. superphosphate, and 1 cwt. Peruvian guano per acre for swedes and yellow turnips, 2 cwt. dissolved bones and 2 cwt. superphosphates per acre is the general allowance. Should the dung run short, an additional supply of from 6 to 8 bushels of ground bones are given. About half the root crop is eaten off by sheep. The artificial manure is sown broadcast, a man sowing five drills at once, which allows it to lie nearer the young plants, and con-

sequently come quicker into action than when it is deposited in the bottom of the drill. From 5 to 6 acres of potatoes are laid down with from 10 to 15 loads of dung, 2 cwt. dissolved bones, and 2½ cwt. of muriate of potash. Mr Brown has erected about 2200 yards of wire fencing at his own expense since 1864, and also some sheds, for which the landlord afforded wood. The cattle consist of shorthorns and crosses, of which some six or eight are annually reared. Feeding stock are tied up about the end of October, and are finished off with a little bruised corn and cake about February, when they weigh from 6 to 7 cwt. Mr Brown used to keep 150 Cheviot ewes to breed from, but they required more grass than was available for them, and on that account they were disposed of. He now keeps half-bred greyfaced hoggs instead. Horses are of the Clydesdale breed, and are hardy, useful animals, working from 70 to 75 acres a pair on level ground. Wages for servants run from £9 to £13, with 33 stones of meal, and twopence worth of milk per day, in the half year. In 1855 wages were about £3, 10s. under the current fees. Where there have been no improvements effected, rents have risen about 20 per cent., but where extensive inprovements have been made, they have increased about 50 per cent. Mr Brown says—"That all capable or managing tenants should have freedom of cropping at least till within two or three years of the expiry of their leases."

The Upper Division of Morayshire.

In continuing our tour, we now leave what is known as the "Laigh of Moray," and emerge into the upper division of the county. We do not intend to go so minutely into the general customs and farm management of the upper districts. The farming systems are not so various as in the lower half, and through the courtesy of the leading proprietors and tenants we are enabled to draw up a pretty full general notice, which will doubtless suffice to indicate the different systems pursued. The upper half may be said to extend to an area of 156,201·655 acres, but a considerable proportion of this is heath or mountain land. The first parish on our journeying in a south-eastward direction is Edinkillie, which extends to 32,904·569 acres, and reaches a total valuation of £6121, 10s. There is a great deal of wood, and most of the parish is fertile, sharp soil, varying from loam to gravel, and is generally well sheltered. Among the most important agricultural holdings is that of Mr James Sinclair, Newton of Darnaway, which extends to 200 acres. The soil in this district is fairly good, and the average rental varies from 25s. to 28s. per acre. The five-course shift is chiefly pursued, viz., two grasses, oats, turnips, and barley. On this farm

oats yield about 5 quarters, barley 4 quarters per acre, but generally in the district barley yields from 5 to 5½ quarters. Land is tilled for roots in the common way, and about 20 loads of dung and from 8 to 10 cwt. of superphosphates and dissolved bones are given per acre. Potatoes are manured much in the same way. Since 1871 the proprietor, the Earl of Moray, has laid out £300 on draining and about £500 on buildings. Mr Sinclair feeds about 14 cattle every year, tying up in October, and selling off when two years old in April. The last three months, in addition to straw and turnips, feeding cattle get from 1 to 1½ lb. oilcake each per day. Fifty breeding ewes and a Cheviot tup are kept on the farm, are summered in a park 25 arable acres in extent, and get turnips in winter. These ewes are bought in in October for about 28s. each, and sold along with their lambs at £3. Mr Sinclair has three active pairs of Clydesdale horses, which work about 70 acres a pair. The first horseman has £14, second man £12, third man £8 to £9 per half year. Girls have about £6. Wages have nearly doubled since 1855.

The Earl of Seafield's estates are among the largest in the north of Scotland. They extend to about 149,500 acres, of which about 40,500 are arable and about 109,000 permanent pasture, including wood and ground reserved for plantation. In 1808 the acreage of cultivated land in the Strathspey estate was 13,000 acres. Properly speaking, the estates in the upper districts of Moray, Banff, and Inverness extend to 124,500 acres, and the estates in the "Laigh of Moray" cover a total area of about 25,000 acres, and consist chiefly of valuable arable land, interspersed with old and young timber. On the latter, since 1864, the proprietor expended on improvements about £39,500, irrespective of expenditure in planting wood. Of that sum, £22,500 has been laid out upon buildings, £5800 upon payment to tenants for improvements made by them, about £3660 upon drainage, £2100 upon fencing, £1150 upon roads, £2730 upon church buildings and schools, £660 upon embankments, and over £500 in various other improvements. Of the Seafield estates in the "Laigh of Moray," 10,000 acres are arable, above 10,000 acres pasture, and about 5000 under wood. The annual rental of it is £10,500, exclusive of shootings, which realise about £1100. The rental in 1855 was £7000. The size of farms on the estate range from 1651 acres downwards. Buildings on the estate are all superior, many of them having been recently built. One of the finest steadings in the country is that of Linkwood, which cost nearly £2000; and another commodious new steading is that of Dandaleith, which cost £1800. The estate all over is pretty substantially fenced, chiefly with wire, and upwards of £2000 has been expended in fencing

since 1864. Since the present factor Mr Smith came to the Strathspey property, nineteen years ago, nearly every farm building has been remodelled, many miles of dykes have been erected, and roads constructed. The duration of lease is nineteen years, with entry at Whitsunday, and after-hand rent. During the past twenty-five years many servants' cottages have been built. Over the whole estate the five-course shift is pursued. Mr Smith became factor for the "Laigh of Moray" estates in 1872, and since then he has made manifest his great enthusiasm and enterprise both in improvement of land and houses. The leases fell out in 1867. The best land is rented at about 24s. per acre. Many crofters pay only about 10s. per acre. While the tenants are encouraged to make improvements, the landlord expends about £6000 annually in improving the estate. The work of reclamation has progressed satisfactorily under the present leases, over 1000 acres of new land having been put under crop.

The farm of Ballintomb is one of the principal holdings in the upper division of the county, and extends to about 300 acres, of which 50 acres are in pasture. In the parish of Cromdale the rental varies from 17s. to 20s. per acre. The soil is generally light, but of a fairly friable and kindly nature. The climate is not suitable for the successful cultivation of barley, but oats yield remarkably well, considering the elevation of the land. About 700 feet above the sea level, oats weigh from 40 to 43 lbs. per bushel in average seasons. The customary way of preparing and cleaning land for turnips in this district is adopted on Ballintomb, viz., ploughing stubbles in the end of the year, grubbing and cleaning in spring. The manure is put into drills at the rate of from 30 to 40 loads of farm-yard manure, with from 4 to 6 cwt. artificial manure, chiefly bones, per acre. Potatoes are similarly treated as regards the manuring of the land. In this district the proprietor has done a great deal in building, fencing, and draining during the past twenty-five years. Farmers should breed cattle more extensively in this district than they do, although they habitually breed more than they feed. We shall refer subsequently to Mr Mann's famous black polled herd. About 400 lambs are wintered on the farm of Ballintomb, being bought in in August and sold in spring. The farm horses in the district, as well as on this holding, are generally good. About 80 acres are allotted to a pair. Servants are mostly single, and get from £8 to £14 per half year. Freedom of cropping is urgently desired by the majority of tenants in this parish. Some farmers are of opinion that the six or seven course shift could be more advantageously wrought in the upper districts than the five-shift system.

The following has been sent us by one of the leading tenants in Strathspey, which gives a very comprehensive, though brief,

description of the farming systems pursued in the upper districts :—

"The average rental of the upper division of the county, or more particularly that portion of it lying to the east of the Spey, may be stated at from 18s. to 20s. per imperial acre, and almost every description of soil is found in it. The haugh lands, lying along the river banks, are generally fine alluvial mould, with here and there a tendency to gravel, while higher up it gradually gets stiffer, colder, and poorer, until the hillfoot farms are reached; they are found to consist very largely of reclaimed moss. By far the greater proportion of the land is farmed in the ordinary five-shift rotation, viz., two years grass, then oats, next turnips and potatoes, followed by barley or oats with grass seeds. About a twentieth of the whole area of the upper districts is worked on the six-shift system, viz., two white crops taken after lea, instead of one, as in the five-shift course. This is found to answer well on strong stiff clay soils, and the second or 'yaval' crop, which invariably gets a little artificial manure, is, in many cases, better than the first crop. The first year's grass is generally divided between pasturing and hay, probably near a half of each; while pasturing altogether the first year, and haying the second, is almost unknown. From 34 to 36 bushels an acre is about the average yield of grain over the upper districts, though of course in many instances the return is very much larger. In exceptional cases in favourable years, as much as 9 quarters, or 72 bushels an acre, have been yielded. Within the past ten or twelve years the use of portable steam mill thrashing has been largely taken advantage of, while now the old portable engine is being entirely supplanted by the traction. Stubble ploughing, or the first stage of preparing the land for turnips, is engaged in immediately after harvest, and farmers generally have the first ploughing finished by Christmas, after which time lea ploughing is proceeded with. The second ploughing, or 'steering,' as it is called, is begun immediately after the grain crops are laid down. If the ground is clean, the double harrowing is sufficient to prepare the turnip break for drilling, but in many cases it requires also grubbing once or even twice, with additional harrowing, a fine mould being a great advantage and assistance towards securing a vigorous braird of the young plants. As much of the land as can be got ready by Whitsunday term (26th May) is generally sown in swedes, which after that date are generally considered too late. Yellow turnips are sown between Whitsunday and the last week of June. Most farmers now, however, have turnip sowing finished before that time except in unfavourable years, such as last year (1881), when, owing to the ravages of 'fly,' and other causes, second and even third sowing had to be resorted to. About 20

yards of dung and from 4 to 6 cwt. of artificial manure is considered a good allowance per imperial acre for turnips, the kinds of manure being of course varied in accordance with the different nature of soils. Potatoes in the upper districts are not grown to any great extent, in many cases not more than are required for family use Polled cattle are getting every year deservedly more into favour, as they are better suited to the climate than the more tender shorthorns. Crosses, however, still largely predominate, and the majority of young stock are generally kept on by the breeder till they attain the age of from twenty to twenty-four months. Feeding cattle are generally tied up immediately after harvest, and are usually ready to be turned out fat about Christmas. Many good feeders there certainly are in the county, as the prize lists of all the fat shows annually testify, and never more so than this year (1881), when the champion of Smithfield was bred and sent from Morayshire; but this is a department of agriculture which is not nearly so well attended to as it ought to be. The breed of horses in some districts could be considerably improved with advantage to farmers, as they are not as a rule equal in quality to that of cattle. Very few really good entire horses come so far north, and they are seldom up to the standard of excellence which the Clydesdale breed is known to possess. Cottage accommodation for servants is still very deficient, though great improvements in this direction are being usually made. The wages of farm servants may be said to have doubled within the last thirty years, though at present they are 10 to 15 per cent. lower than they were three or four years ago. The number of acres allotted to each ploughman and pair of horses varies greatly with the different kinds of farms. On steep farms of strong land, 60 to 70 acres is all that a pair can work; while on a level easily wrought farm, they can overtake about 90 acres. Interest of buildings and drainage contribute largely to increase rents, and in many cases a good deal of improvement in this way is still required and will doubtless be soon effected.

The scenery in Strathspey is magnificent, and the arable land on either side of the river Spey rises with gentle aclivity, and stretches for a considerable distance up the sides of the hills. It is a great resort of pleasure seekers during the summer and autumn, when crops are wearing their richest tint of beauty, and the woods clothed in their most gorgeous foliage. Nowhere could one better enjoy the charms of mountain scenery or the bracing atmosphere of a harvest morning.

The Ballindalloch estate lies principally in Banffshire, but about 10,000 acres extend into the county of Moray. Roughly speaking, 2000 acres of these are arable, while there are about 7000 acres of hill pasture and 1000 acres of wood. The valuation of the Morayshire estates in 1866–67 was £2267, 7s., and

now it is £2685, 2s. 10d. The land under cultivation is generally good loam resting on gravelly subsoil. The size of farms varies from 20 to 200 acres arable. A great many of the tenants have, in addition to arable ground, grazing privileges on common hill. The farm houses are principally slated stone buildings, and many new ones have been erected since 1857. A large extent of wire fencing has been constructed during the past twenty-five years. Roads over the estate are very good and well kept. About 200 acres of land have been reclaimed within the past twenty-five years and are now good arable ground. It was trenched chiefly with the spade 14 inches deep. Before reclamation, the ground was rough pasture, full of boulders, worth about 3s. 6d. per acre, and is now worth from 20s. to 25s. The total cost of reclamation, including drainage and trenching, amounted to from £20 to £25 per acre,—prospects of remuneration about 5 per cent. The land reclaimed on the lower lying grounds has been profitable to the landlord, but not on the poorer soil on the hill sides. The duration of lease is nineteen years, the tenant entering at Whitsunday to houses, old pasture, sown grasses, and break for green crop, and at the cutting of the crop to the land under grain crops. Many tenants take over from outgoing tenants, at valuation made by mutually chosen arbiters, first year's grass, grain crops, and thrashing mill, &c. When the proprietor advances money not specially stipulated for in the lease for improvements, the tenant pays 6 per cent. for drainage and 5 per cent. for building. In cases of building, the proprietor usually provides wood and slates free of cost, and the tenants pay all the other expenses, without having any claim for meliorations. Generally speaking, most of the buildings are erected by the landlord at the commencement of new leases, without interest, the tenants performing the carriage of all material free. The average rental per acre on the estate is 20s. and the extreme 30s. Rents are paid at Martinmas and Whitsunday. Servants on this property are partly married and single, and the best servants belong to the former class, as they remain in their respective places for a number of years, when well supplied with good cottage accommodation. The estate is fairly well provided with cottages. The system of rotation is arranged according to the estate regulations.

The cattle on the Ballindalloch estates are generally either pure bred Aberdeenshire cattle, or a cross breed from black polled bulls and shorthorn or cross cows, and are all reared on the farms. Sir George Macpherson Grant is the owner of perhaps the finest polled herd in the kingdom, and to it we shall hereafter refer. There are no sheep farms on the Morayshire property. There are a few crofters on the estate, who mostly work as tradesmen and farm labourers, and who generally hold

their crofts from year to year without a lease. Several hundred acres of wood have been planted since 1857. Sir George farms extensively himself. During the past twenty-five years not only has the Morayshire property been vastly improved, but through the great interest which Sir George takes in the welfare of his tenantry, and latterly the energy of Mr Douglas his factor, the whole estates, both in the counties of Banff and Moray, have been greatly improved and enhanced in value.

On the Ballindalloch estates there are many well-managed and highly-productive farms. In the parish of Knockando the soil is variable, but, generally speaking, pretty equally divided between loam and light gravelly land. The farm of Tomlea, tenanted by Mr George Younie, is very carefully and judiciously managed, and the soil is partly good, but the climate is cold and late. It extends to 80 acres arable and 20 or 30 acres pasture. The rental over the districts varies from 18s. to 20s. per acre. Mr Younie is bound to the five-shift rotation. The returns of crops in a good year are as nearly as possible from 5 to 6 quarters barley and oats, the former weighing from 54 to 56 lbs. and the latter from 42 to 44 lbs. per bushel. The land for turnips is ploughed deep soon after harvest, and is harrowed and ploughed, and harrowed again before it is drilled. About 24 loads of dung with 5 cwt. dissolved bones are given per acre. Yellow turnips scarcely get so much artificial manure as swedes. Potatoes are planted only in such quantities as to meet home requirements. Mr Younie has improved about 26 acres since 1855, and the proprietor built a dwelling house, upon the outlay for which the tenant pays 5 per cent. interest. The cattle of this farm are black polled. Six animals are bred every year, and four are bought in, and all except the cows are sold when two years old. Farmers in this district breed far too few cattle. Horses are not heavy as a rule, but are hardy useful animals. Seldom does a first class entire horse travel the upper districts, and consequently farmers have not a good chance of improving the breed. More strength is required to work the land than in the "Laigh of Moray," and the general allotment is a pair to about 50 acres in the Knockando district. Almost all the foremen servants are married, with houses, meal, and fire, and £24 a year. In 1853–54–55, Mr Younie paid the first man £16, £16, and £18 respectively in the year, with the same allowances as are now given. Rents have risen about 20 per cent. since 1852. Freedom of cropping would be practically a great benefit to farmers. There were no swedes grown in this district prior to 1852.

The Spey does not form the dividing line between the counties of Banff and Moray until near Fochabers; and the greater part or 7947·230 acres of the parish of Boharm, though on the eastern

side of the river, lies within the county of Moray, and so does also 1883·767 acres of the parish of Keith. In Boharm there are several good farms, which are well managed and highly productive. The farm of Auchroisk, tenanted by Mr L. W. Fraser, extends to an area of 170 arable acres and some 30 acres of pasture. The average rental of the district is about 24s. per imperial acre. The soil is various, consisting of black loam, gravel, clay, and moss. The average yield of barley on Auchroisk is from 4½ to 5 quarters, weighing from 54 to 56 lbs.; oats, from 5 quarters to 6½ quarters, weighing from 39 to 44 lbs. per bushel. There is no wheat sown in this district. The five-shift system of rotation has been prevalent in this parish for the last twenty or thirty years, and in the unanimous opinion of the farmers has reduced the fertility of the land very considerably. The soil requires more rest; and if rents were reduced in accordance with the condition of the land, the six or seven course shifts would be universally practised hereafter. This would be a very desirable change in the system of farming, from the fact that it would lessen the expenditure for manure, and also enrich and fertilise the soil. Land for turnips is sometimes dunged before being ploughed in the autumn, but most frequently immediately before sowing in spring. The cattle on this farm and in the district generally are a cross breed between a shorthorn bull and cross bred cows. The staple diet is turnips and straw, and feeding cattle are finished off with a little cake and oats. About fifteen years ago three-year-old cattle were mostly used for feeding purposes; but since grain and other sources of remuneration have been of so comparatively little value, farmers could not afford to retain cattle so long, and therefore, in order to meet demands upon them, farmers have had to fatten and dispose of them when they are about two years of age. Sheep from further inland districts are extensively wintered in this parish, but no regular flocks are kept. Horses are good, and work at the rate of 60 acres a pair. The average wages of ploughmen run from £9 to £13 per half-year with rations. In 1876 good ploughmen were getting from £17 to £18 in the half-year. Rents have risen from 30 per cent. to 40 per cent. in this district since 1850. They are in many instances too high, considering the unfavourable climate.

The farm of Bush, tenanted by Mr Gray, is 160 arable acres in extent, and is laboured in the six-shift system. The soil is sharp and thin. Oats after lea always bulk best, and the grain weighs from 40 to 43 lbs. per bushel. Land for turnips is twice ploughed in spring, and gets from 18 to 20 loads of dung along with a mixture of bones and bone meal to the extent of from 4 to 5 cwt. per acre. The proprietor advanced money for draining from 70 to 80 acres of land, for which the tenant pays

interest; and the dwelling house and farm steading have been erected during the past twenty-five years on similar conditions. Cattle are chiefly cross bred, and are fed off with turnips, cake, and corn, and weigh from 8 to 9 cwt. when fat. Horses have improved vastly since 1857, but there is still need for improvement. From 70 to 80 acres are allotted to a pair. Turnips usually yield at the rate of from 12 to 18 tons per acre, oats from 3 to 6 quarters per acre, and barley from 4 to 5 quarters. The latter is the most remunerative.

One of the best managed farms in the district is that of Stoneytown, which is 150 acres in extent, and is held by Mr M'William. The soil consists of loam, clay, and gravel, which are lying on rock and clay subsoil. The six-course shift is pursued. The average yield of oats and barley on Stoneytown is about 5 quarters per acre—the former weighing 42 lbs. and the latter 54. For potatoes and turnips Mr M'William ploughs deep in the fall, and then harrows and ploughs again in spring. It is manured in the drill with about 20 loads of dung and from 6 to 7 cwt. of dissolved bones and bone dust per acre. Since Mr M'William became tenant in 1868 he has drained a good deal, built some dykes, reclaimed by trenching about 7 acres of land, and performed the cartage of a new steading and dwelling house erected by the proprietor, for which he pays 5 per cent. interest. We shall advert to Mr M'William's shorthorn herd under the appropriate heading. He also rears and feeds cross bred cattle. Turnips and straw constitute the staple diet, with a little cake and oats to finish off. The cattle are disposed of when from 5 to 7 cwt. in weight. Home bred cattle pay best. About a score of Leicester ewes are kept on the farm, and the male lambs are sold about the 1st of October. Mr M'William has an excellent stud of the Clydesdale breed; they work about 75 acres a pair. Wages have advanced fully a third since 1855, and since then rents have been doubled in many cases. Bare fallow, which was so common twenty-five years ago, is scarcely to be met with now, and yet the land is better cleaned and manured than it was then.

The parish of Rothes, on the western side of the river Spey, covers an area of 19,234·453 acres. It contains a large breadth of excellent land, while there are also portions of inferior soil. Along the side of the Spey fertile loam and rich alluvium abound, while towards the foot of the hills coarse clay, moss, earth, and gravel are occasionally to be seen. The largest farm in the parish is Drumbain, occupied by Mr William Brown, Linkwood, Elgin, and the property of the Earl of Seafield. It is 1651 acres in extent, and is rented at £435. Perhaps the most pleasantly situated farm in the parish is that of Dandaleith, tenanted by Mr John Cruickshank. It is 407 acres in extent,

the rental being £516. The soil over the farm is rich alluvium, and is well nourished by the tenant.

In the extreme north-eastern corner of the parish of Rothes, on the bank of the Spey, is the choice farm of Garbity,* tenanted by Mr James Watt. It covers an area of 220 arable acres, is rented at 35s. an acre, and is carefully and skilfully managed. Mr Watt is also tenant of the farm of Mulben, in the parish of Boharm, which is 240 arable acres in extent. The soil on Mulben is of a light, blackish nature, while on Garbity it consists of fine light loam. In the district surrounding Garbity the rental runs from 15s. to 35s. per acre. Mr Watt works on the five-shift system on Garbity, and adopts the six-course rotation on Mulben. The latter system is most approved of. In good seasons wheat and barley yield about 5 quarters per acre on Garbity, on which there are no oats grown. On the farm of Mulben oats yield about 6 quarters per acre, barley 4½ quarters. The land here is rented at about 23s. per acre. Mr Watt subsoils his turnip land in the autumn with one of Sellar's diggers, grubs it in spring, and manures as heavily in the drills as possible with dung, along with from £3 to £3, 10s. worth of artificial stimulants per acre. The allowance of seed for swedes per acre is 3 lbs., and 2 lbs. for yellow turnips. About 7 acres of potatoes are grown after lea, and the usual width of the drill is 29 inches. Dung for these is spread over the surface of the lea before being ploughed in the autumn, and about 3 cwt. of manure added when they are being planted. The varieties of potatoes grown are Victoria Regents, Magnum Bonums, and sometimes Champions, and the quantity of seed varies from 10 to 12 cwt. per acre. The artificial manure is deposited by a sowing machine. Mr Watt expended £100 in building, and also made roads and drained a few acres of land at his own expense. In some of the following pages we allude to the superiority of his herd of shorthorn cattle. On the two farms Mr Watt breeds 40 cross cattle every year, and feeds them along with bought-in stock when two years old. They are tied up for feeding in October, and, weighing from 7 to 8 cwt., are ready for the market at Christmas. Besides turnips and straw, they receive cake and bruised oats. About 120 half-bred ewes are kept between the two farms, and they rear about 200 lambs. The lambs weigh about 65 lbs. in spring when fat, and are sold at about £2, 15s. each. They get about ½ lb. of linseed each per day. The farm horses are very good, and work at the rate of 80 acres a pair. Mr Watt's servants are all married, and most of them have houses on the farm. They get from £16 to £18, along with 3¼ bolls of meal, 1 ton of coals, and fully 1 ton of potatoes, each in the half-year. The rent on Garbity is the same as Mr Watt

* This farm is now (1883) tenanted by Mr Stewart.

paid on entering it eighteen years ago. He thinks that farmers might work the six-shift system more advantageously than the five-course shift on medium soil, but not on very heavy land.

We have omitted to mention, however, that about two miles below the village of Rothes is the pass of Sourden, near to which is the famous Haugh of Dundurcas. The farm of Dundurcas, occupied by Mr Mantach, contains some 200 acres of good deep loam. The extraordinary flood of 1829 did not deprive this farm of its rich surface so much as it did to those lying further down the river, and consequently the land is as fertile as it is deep and friable. Mr Mantach, like mostly all the other tenants along that side of the county, adopts the five-shift course, and is a careful breeder of cross cattle, which he generally disposes of fat when two years old.

A little further down the river we reach the farm of Collie, the outmost farm in this direction, on the Seafield estates, which is tenanted by Mr Sutor, solicitor, Elgin. The land consists of a medium loam dispersed with patches of gravel and light sandy soil, being particularly light along the river bank. The farm is in capital order, and produces good crops of barley, oats, and turnips. Mr Sutor has not grown wheat for a few years, but sows barley instead, which, when grown after second year's grass, is found to be very suitable. The farm-yard manure is all spread in drills in the turnip break at the rate of about 20 yards per acre, along with 8 cwt. of artificial manure, composed of bone flour, ground coprolites, and mineral superphosphate. The cattle kept are the ordinary crosses, and are sold off fat in spring when two years old. Each cow generally fosters two calves. Mr Sutor for some years has kept a flock of high bred border Leicesters. His ewe stock consists of about five score, which have principally descended from rams of the Kinochtry stock which he purchased some years ago at the Aberdeen annual sales. The tups are sold annually as shearlings. A large lot of them averaged £16, 15s. 1d. this year (1882). They only get artificial food about three weeks before being sold. Mr Sutor has been an extensive exhibitor of sheep. In 1881 he won the first prize cup and special prize at Elgin. The whole of his horses are pure bred, and eligible for the stud book. He has been also a successful exhibitor of horses. At Elgin, Aberdeen, and the Highland and Agricultural Society's shows, in 1874 and in 1875, he won the first prize for brood mares. He also gained many other creditable prizes. Mr Sutor is not an advocate for compensation for unexhausted manures—as a lawyer merely he would welcome such a measure,—but insists that tenants should have freedom of cultivation, free sale of their produce and subjects, and at the same time be bound to farm in accordance with the rules of good husbandry.

The farm of Burnside, occupied by Mr James Bruce, extends to 365 acres, and is on the Richmond estate. The soil is chiefly alluvial, and is in a high state of fertility. The rent is £520, or nearly 30s. per acre. The five-shift course is adopted by Mr Bruce, and his farm is very productive. He uses a great deal of artificial food for stock, and his farm-yard manure, which is devoted chiefly to turnips, is of the very richest nature. From 20 to 30 yards of it is given along with 8 cwt. artificial manure per acre. He has an excellent herd of shorthorn cattle on the farm, in all about 70 head, breeding at the rate of 30 animals every year. His cows are of the most fashionable strains, and are excellent breeders and milkers. For many years Mr Bruce's bull calves have commanded the highest averages at Forres and Perth sales. His stock bulls have been the famous "Baronet," which never left its box but to conquer; "Royal Windsor," "Earl of March," and his present bull "Knickerbocker," the champion national winner of 1881 at Stirling. In his breeding stock Mr Bruce has repeatedly won the challenge and champion cups of the Morayshire Farmers' Club, Spey, Avon and Fiddich-side Farmers' Club, and the Royal Northern Agricultural Society; and for many years has been an extensive exhibitor at the shows of the Highland and Agricultural Society, winning the first premiums for old and young bulls last year, along with the Tweeddale gold medal at Stirling. There is, in addition to the shorthorns, a few good cross feeding cattle kept, being chiefly bought in young and sold off fat when two years-old, weighing from 8 to 9 cwt. On the farm there is almost always to be found a few choice animals in preparation for the great English fat stock shows, at which he has been most successful. In 1871 Leeds presented him with a class prize and champion cup, and Smithfield with a champion cup for heifers. In 1872 Smithfield sent him a class prize and champion cup for an excellent ox bred by Mr Macpherson, Auchlochrach, Glenrinnes, in addition to which, and with the same animal, he gained the blue ribbon cup for that year. In 1873, Hull presented him with a hundred guineas plate, while in 1874 Newcastle sent him a beautiful plate. In 1878 York awarded him a champion plate; and many other trophies of lesser importance awarded to him could be recorded. The farm houses are in good order, the dwelling-house having been recently erected, partly by the landlord and the tenant.

Nairnshire.

Having completed our Morayshire pilgrimage, we now proceed to describe our recent tour throughout the county of Nairn. The general configuration of the county has already been noticed, but it may not be out of place to mention that the lower

districts are thickly wooded, and present a pleasant aspect, more particularly in the autumn. The upper reaches are more of a rugged and mountainous character, and the scenery is uninteresting. We commenced our tour on the eastern border in the parish of Auldearn, which was rented at £9650, 12s. 11d. in 1866–67, and now at £10,091, 15s. 5d. The most extensive proprietor is Mr Hugh Brodie of Brodie, Brodie Castle, whose property in this parish brings a rental of £2606, 15s.

The farm of Easter Clune, occupied by Mr James Russell, extends to 700 acres, of which only 150 acres are arable. The rental in the district generally is about £1 per acre. The soil on this farm consists of a black loam, with a clay subsoil, and the climate is rather cold but dry. The five-course shift is adopted, viz., two grasses, a white crop, a green crop, and again a white crop sown with grass seeds. Corn crops yield about 4½ quarters of grain per acre, and about 300 stones of straw; turnips yield about 16 tons, and hay about 110 stones (23 lbs. per stone) per acre. The systems of cleaning and preparing land for turnips seem to be universally the same as are adopted by the Morayshire farmers. About 18 loads of dung, accompanied by about 7½ cwt. dissolved bones, constitute the manurial allowance per acre of turnip land. Potatoes receive the same treatment as turnips. Mr Russell has reclaimed about 15 acres of moorland during the past twenty-five years, and the landlord has drained about 12 acres, for which the tenant pays interest. Cross cattle are the prevailing breed. From 6 to 8 calves are reared on the farm yearly, and about 20 cattle are fattened. The heifers are tied up about the middle of October, and sold off in January, and the stots in April. Besides liberal supplies of turnips and straw, from 2 to 4 lbs. of oilcake and a little corn are given to each animal *per diem*. Heifers when fat weigh generally about 4½ or 5 cwt., and stots about 6 cwt. Mr Russell thinks farmers might breed more cattle with advantage. About 400 hoggs are wintered on the farm. The stud is very superior, possessing a good deal of Clydesdale blood. The customary allotment of land to a pair of horses is about 75 acres. Farm servants in this district are mostly single, being a proportion of two to one married man. Wages range from £30 to £40 a year, and have doubled at least since 1855. Cottages average about 1½ to each farm. Rents have risen about 15 per cent. within the past thirty years, and have been too high for about five years. Barley is the most profitable cereal cultivated.

Though only 67 arable acres in extent, the farm of Garlickhill, occupied by Mr Alexander Mackintosh, is one of the model farms of the day. It is rented at £109, 10s., or about 33s. per acre, and is on the estate of the trustees of the late John Gordon

of Cluny. The average rental in the neighbourhood of this farm is 25s. The soil is generally very good, resting on red clay and gravel, and some patches of moss. The rotation is universally the five-shift system, but on light land three years' grass is very suitable. Barley on Garlickhill yields from 3 quarters to 6 quarters per acre, or an average of about 4½ quarters, and weighs 56 lbs.; oats return about 5 quarters, weighing 43 lbs., and rarely 45 lbs. per bushel. The stubble land, in the end of the year, is ploughed from 8 to 10 inches deep; and when the land is tolerably dry, the drills are opened at an average width of 27 inches. Twenty loads of dung are given to the acre of land, and is spread along the drills, and in addition to this about £2 worth of artificial manure is allowed per acre. It consists of crushed and dissolved bones, a little phosphates, and about 2 cwt. of salt. For potatoes, a proportion of the oldest grass land on the farm is heavily dunged before it is broken up, and when the drills are opened about 4 cwt. artificial manure is deposited per acre. Mr Mackintosh has drained a great breadth of land, and for money advanced by the landlord for the work he pays 3½ per cent. Five polled and five cross cows are usually kept for breeding and dairy purposes. The bull is of the shorthorn breed. The young stock are sold off when three-quarters old, as the tenant finds it more lucrative to keep a number of cows, and sell milk to the neighbouring villagers, than to keep feeding cattle. The pasture of the farm is let for sheep wintering, along with nearly one-third of the turnips, which are consumed on the field. Horses are of medium size, and well bred. Wages for farm servants have nearly doubled since 1855 on this farm. Men have from £10 to £15 with board; women and boys, £5 to £6 per half year. Rents in this parish are reckoned to have risen from 10 to 15 per cent. since 1850. Wheat-growing in this county has ceased, and more attention is devoted to the breeding and feeding of stock. Far more potatoes are grown now than twenty-five years ago. Probably the higher prices of beef and potatoes make up for the absence of wheat, while the expense of extraneous feeding-stuffs is returned in beef and manure. The tenant is of opinion that freedom of cropping, subject to the laws of good husbandry, coupled with greater liberality on the part of the proprietors in respect of permanent improvements, such as building and drainage, would be beneficial, but that everything else must be left and settled by the common rules of supply and demand.

On the lands of Boath, the property of the late Sir James Dunbar, Bart., is the farm of Bogside, occupied by Mr William Anderson. Its total area is 103 acres, all arable, and it is rented at £2 per acre. The soil is light, and the climate good. Mr Anderson adopts the five-shift rotation. Cereals yield from 4 to 5 quarters

per acre, and weigh a little over the standard measure. Turnips and potatoes grow well. Land for the green crop gets from 20 to 25 loads of dung and 6 cwt. artificial manure per acre. Cross cattle are bred and fattened on the farm. They are fed on turnips, straw, and cake, and are sold at the weight of from 5 to 6 cwt. The horses on the farm are good, and work from 60 to 70 acres a pair. Mr Anderson pays from £10 to £13 for men, and £5 to £6 for women and boys, exclusive of board. Mr Anderson thinks farmers should have liberty in cropping.

As we proceed westwards the scenery becomes more varied and beautiful, and the systems of farming more various and interesting. The parish of Nairn contains soil varying from heavy mould to light sand. The valuation of the parish in 1866–67 was £5939, 13s. 5d., and is now £7190, 14s. 1d. The principal objects of interest are the remains of Castle Finlay, of Rait Castle, and of the old chapel where the Kilravock family are buried. The Cawdor estates, which make a total area of 46,176 imperial acres, go more extensively into the parishes of Nairn and Cawdor than any other property in the county. Of the total area 5776 acres are under wood, 2920 acres arable ground, and 37,480 of moorland and hill pasture. The total rental in 1855 was £6070, and in 1881, £7930. The land over the estate is chiefly light loam, resting on gravelly subsoil. The number of farms on the property is 154, of which 27 holdings are rented above £100 and 127 under £100. Houses are generally substantial and in good order. Many of them have been built since last letting of farms, the tenants carting materials and the proprietor paying the cost of building. Since 1849, when new leases were entered upon, a considerable extent of waste land has been reclaimed by the tenants, when, in many cases, large quantities of stones were turned up, which the tenants carted to the lines of dykes laid out by the land surveyor, and built by the landlord. Previous to 1849, the whole estate was gone over by a surveyor, and the new marches of the farms were squared up. The tenants seem satisfied with the result of their reclamations, and when leases expire a rise of rent is generally obtained. Rents are payable half-yearly, at Martinmas and Whitsunday, after reaping the crop. There are some married servants on the larger farms, but very few on the smaller ones. A good many cottages for married servants and labourers have been erected during the last twenty-five years.

The farm of Easter Delnies, in the parish of Nairn, is tenanted by Mr John Davidson, and has a total acreage of 690 acres, of which 240 acres are arable, 120 acres coarse pasture, and 350 acres under wood. The rental is £170. The soil on the farm is mostly light and sandy, and is intersected by pendicles of good loam. The five-course shift is pursued. Barley returns about

5 quarters per acre, and weighs 56 lbs. per bushel; oats, 6 quarters, 43 lbs.; and potatoes about 4 tons per acre. The land is manured for roots with 24 loads of dung and 4 cwt. artificial manure per acre. Mr Davidson entered the present lease in 1873, when the farm was in bad condition, and now it is in a much better state. He got a new steading on entry, for the building of which he carted materials, and pays Government interest during the lease. The tenant breeds cross cattle in part and buys in part, feeding annually from ten to twelve, which, with liberal supplies of turnips and straw, combined with a little nutritious cake and bruised corn, they weigh about 5 cwt. each about three months after they are tied up, when they are sold off. He lets the pasture during winter along with a quantity of turnips. The pasture is sufficiently extensive to carry 400 sheep. A pair of horses work about 86 acres. Single farm servant men get from £10 to £12 in the half year. Under the present five-shift system the land is becoming unsuitable for turnips and grass. A recourse to the six-shift rotation would, in Mr Davidson's opinion, give better turnips and grass, and prevent finger-and-toe damaging the former.

The farm of Crook extends to 184 arable acres and 4 pasture, and is pleasantly situated on the right bank of the river Nairn. It is rented to Mr William Malcolm at £199, and is part of the property of Colonel James A. Grant, C.B. The rental in the district ranges from 14s. to 40s. per acre. On the farm of Crook the soil is of a kindly lightish nature, and is wrought under the five-shift rotation. Crops yield variously, being more apt to suffer from a deficiency of moisture than from too much. Oats and barley yield from 2 to 5 quarters per acre, and the grain, both in respect of quality and weight, is invariably good. Turnips yield from 12 to 24 and potatoes from 3 to 6 tons per acre. Land for the root crop is usually twice ploughed, grubbed, and harrowed several times before it is properly cleaned. From 20 to 24 loads of dung, along with from 4 to 7 cwt. of dissolved bones, constitute the manurial ingredients applied per acre. Potatoes are grown after two-year-old grass, which is covered in the autumn with a heavy coating of dung before being ploughed, and immediately before planting from 6 to 7 cwt. of dissolved bones are applied. Mr Malcolm reclaimed about 20 acres of low marshy ground, and the proprietor ploughed 40 acres of light land (which had previously been under wood) with six oxen during the past twenty-five years. The farm stock of breeding cattle consists of polled and cross cows and shorthorn bull. Twelve calves are reared, and in every case, when practicable, each cow has to suckle two calves. The young stock are kept in open courts till they are two years of age, when they are sold in April or May at from £20 to £24. From ten

to twelve purchased cross cattle are tied up immediately after harvest, and are sold in January, weighing from 5 to 6½ cwt. each. They are fed on turnips and straw, with draff, burned ale, bruised oats, and rye. Mr Malcolm has a stud of very superior horses, which work at the rate of 70 acres a pair. There is a good deal of carting done in driving feeding stuffs from the distillery and manure from the town of Nairn. Wages for servant men vary from £10 to £15 for six months. They have risen about 30 per cent. since 1850. More cottages are required. Tradesmen's bills have also risen very greatly. Rents have advanced greatly during the past thirty years. In many cases they are too high, especially in unfavourable seasons, such as have been experienced for some time; but fears are entertained that insufficiency of capital has something to do with the results being unfavourable. Barley is the most profitable cereal.

Househill Mains, tenanted by William H. Kelman, extends to 160 acres. It is beautifully situated, and systematically and skilfully wrought. About half the farm consists of haugh land, lying on the right bank of the river Nairn. The nature of the soil varies from fine mould to sandy loam, and the climate is mild and early. The farm steading, which was erected a few years ago by the proprietor, Colonel James A. Grant, C.B., in the most modern and approved style, is situated about the centre of the farm. Mr Kelman adopts the five-shift rotation, and grows potatoes on part of his lea ground. Crops yield pretty equally in a good season. Barley gives from 4 quarters to 5 quarters, weighing about 57 lbs.; oats, 5 quarters, weighing 43½ lbs. per bushel. In the autumn the digging and ploughing of the land for turnip crop are the leading items of labour; and after the ground is thoroughly pulverised in spring with repeated grubbing and harrowing, it receives from 20 to 25 loads of dung per acre, and from 6 to 8 cwt. of artificial manure. The latter is a composition of 2 cwt. dissolved bones, 1½ cwt. bone meal, 2 cwt. superphosphates, ¾ cwt. sulphate of ammonia, and a small quantity of guano. Mr Kelman limed part of his farm this year, giving it about 5 bolls per acre to the lightest land. If the land is clean, he ploughs down the dung for the root crops in autumn. Among the improvements effected on the farm since it came under the tenancy and management of Mr Kelman, perhaps a new thrashing machine put in by Mr R. G. Morton, Errol, Perthshire, is the most notable feature. Attached to this machine, and driven by the same steam-engine, are a chaff and straw cutter, root-pulper, corn-crusher, and corn-blast, all of which have been furnished by the same engineer. The thrashing machine, though seemingly intricate in its construction, is very simple and efficient in its working. The corn-blast attached to the mill is a very ingenious affair. The grain as it leaves the

mill is blown through a wide tube, 60 feet long, into the grain loft, the tube making a right angle turn at its highest point. Being in the immediate vicinity of the burgh of Nairn, Mr Kelman has started a dairy for supplying the town with milk. This is an institution which was very much needed, and is now being esteemed. The present dairy stock is composed of about twenty cows of the best Ayrshire and cross breeds. To these very succulent food is given, as it is found to be efficacious in sustaining and improving the milking properties of the animals. Mr Kelman has also a very nice black polled bull and a number of fattening cattle. The feeding stock are kept in a commodious half-covered court. His horses are strong and active, and work from 80 to 100 acres a pair. The proprietor has planted about 2 acres of arable land along the public roadside, and has also planted from 7 to 8 acres of land on the neighbouring farm of Crook within the past few years.

On the estate of Mrs Anne Agnew Mackintosh or Walker is the large and superior farm of Heathmount, tenanted by Mr George M'Beth. It covers an area of 175 arable acres, and is rented at £283. In this district the rent of arable land runs from 22s. to 40s., whereas in the upper districts of the county it ranges from 5s. to 20s. The soil is good and the climate genial. The tenant is strictly bound to the five-shift rotation. Oats yield from 3½ to 6 quarters per acre, and are seldom under 42 lbs. in weight; barley, from 3 to 5 quarters, weighing about 56 lbs. per bushel. About 20 loads of dung and from 4 to 7 cwt. artificial manure is given per acre to land for the green crop. The implements of husbandry have undergone great improvement since 1850. Then threshing corn with the "flail" was a daily occurrence, and now the crop is all thrashed with machinery, and a great part, particularly of barley, with steam. Crops are all reaped with reapers. The proprietrix has done much in the way of improving buildings. Cattle are chiefly of the cross breed, and are sold off when fat, weighing from 5 to 6 cwt. each. Mr M'Beth buys in sheep in the autumn, feeds them on turnips, and sells them in March or April. The farm horses are good, and work from 50 to 75 acres a pair.

On the western side of this parish is the estate of Lochdhu, which is 754 acres in extent, of which there are 684 acres of arable land, 30 of pasture, and 40 under wood. In 1866–67 the yearly value of the property was £263, 18s. 9d., and now it is worth £650, 9s. 3d. per annum. Over the estate the soil varies from moss, sand, and loam to gravel. There are only two farms on the property, one 544 acres and the other 140 acres in extent. Commodious steadings have been built within the past ten years. The farms are ringfenced and subdivided with wire. There was no fencing thirty years ago. Roads generally are

good. The extent reclaimed during the past thirty years is about 284 acres. The character of the land before reclamation was soft and marshy, worth about 2s. 6d. per acre, and now, since it has been efficiently drained, it brings from £1, 10s. to £1, 15s. The cost of reclaiming was about £10 per acre. The land is now productive, and gives good crops. It has been profitable to both landlord and tenant. Rents are all paid in money, but previous to 1855 they were mostly paid in grain. The five-course shift is universally adopted. The cattle kept on the estate are generally crosses. A good deal of cake is used in feeding. There are no sheep farms on the estate. There are about thirty crofters or cottars on the property. The latter pay small rents, and earn a livelihood by farm work and other labour by the day. Crofters hold the crofts on lease, and pay about £1, 10s. per acre. A great deal has been done in the way of planting since 1855.

Situated on the estate of Mr Hugh Davidson, and in the parish of Croy, the farm of Cantraydown, occupied by Mr Angus Macpherson, is one of the most skilfully managed holdings in the district. The parish was valued at £3033, 11s. in 1866–67, and in 1881–82 at £3881, 16s. 6d. The farm of Cantraydown extends to 200 acres arable and 600 pasture, is rented at £155, and partly consists of porous haughland with a prevalence of moss and gravel. The five-course shift is pursued, and in good seasons good crops of grain and roots are obtained. The land is always most carefully prepared for seed, more particularly for roots. It is also dunged heavily, and well furnished with artificial manure. Less manure is given for potatoes than for turnips. Mr Macpherson has reclaimed about 100 acres of land during the past twenty-five years, the proprietor cutting a few of the leading drains. The cattle are of the shorthorn and cross breeds, and are mostly disposed of when two years old. Sheep are kept only during winter. Horses are of the Clydesdale breed, but have not improved much of late. The common allotment to a pair is 70 acres. Servants' wages have advanced about 100 per cent. since 1855, and few cottages have been built. Rents have risen about 15 per cent. during the past twenty-five years.

In the parish of Cawdor there is a large extent of moss and thin soil, but it also contains some fertile land. There are also extensive woods surrounding Cawdor Castle, which is one of the most perfect and time-honoured examples of a feudal fortress in the north. The scenery is truly magnificent. About the centre of the best agricultural district in the parish is the fine farm of Brocklea, which is 320 arable acres in extent, and is in the possession of Mr Robert Fraser. The rental of this farm amounts to 36s. per acre, but the average rental of the

district does not exceed from 28s. to 32s. The soil on Mr Fraser's holding is a light loam on a gravelly bottom, and over the lower half of the parish the land is of a shingly nature. Large proportions of a hard blackband of heath running over a number of farms have been reclaimed by the tenants during the past thirty years. The prescribed mode of tillage on the Cawdor estate is the five-course shift, from which, however, many farmers would gladly deviate. Barley is the favourite cereal generally, as it is most adapted to the peculiarities of the climate. In ordinary years it yields at the rate of from 32 to 36 bushels per acre, and weighs from 54 to 56 lbs. per bushel, but it has not exceeded 28 bushels per acre and 53 lbs. in weight for a few years past. The land for the root crops is prepared in the usual way, and turnip sowing is generally finished by the 10th of June. The manurial dressings for these consist of dissolved bones, superphosphate, and guano, to the amount of from 2½ to 4 cwt. per acre, irrespective of a small allowance of farm-yard manure. Farm-yard manure, however, is, as a rule, nearly all required for the barley crop in spring, and hence only a small quantity is available for the root crop. The general quantity of turnips obtained per acre varies from 15 to 20 tons. There have not been many noteworthy improvements effected on this farm during the past twenty-five years, so far as land is concerned; but over £2000 have been expended by the tenant, exclusive of £1000 by the landlord, in erecting new farm buildings. No meliorations are allowed for the tenant's outlay at any period of the lease. About forty years ago this farm was rented at less than half the present value, the present tenant's father, who was formerly occupier of it, having since then reclaimed more than one half of the holding from woods, bogs, and gorse. Cross-bred cattle from polled cows and shorthorn bull constitute Mr Fraser's herd. Of thirty cows twenty-four are used purely for breeding purposes; most of them suckle two calves, while six or seven are kept as dairy cows. The feeding stock are generally fattened on pulped food, containing a mixture of straw and chaff and artificial food. Besides this, they get an allowance of cake morning and evening, which is increased as the animals mature for the market. They weigh from 6½ to 7 cwt., and are tied up late in autumn and sold off when two years old. The farm horses of the country have improved immensely within the past twenty-five years. Better stallions of the Clydesdale breed have been travelling Nairnshire during the past fifteen years. The horses of the upper district are a small and light class, but generally work from 65 to 75 acres a pair. The "bothie" system for servants is much in use in this county, there being a universal scarcity of cottages for married men. If there had been sufficient

cottage accommodation married men would generally be preferred. The assistance that can be obtained from their wives and families in outdoor labour and barn work, gives them a preference, especially in districts where it is very difficult to get day labourers in spring, and during turnip hoeing and harvest.

Near the village of Cawdor, and on the borders of Inverness-shire, is the compact farm of Budgate, occupied by Mr Joss. The soil is light and gravelly, but the climate dry and favourable. The five-course shift is pursued. Crops yield well in moist seasons, but are frequently reduced from want of rain. Turnip land gets a liberal supply of both farm-yard and artificial manure, the latter consisting for most part of dissolved bones and phosphates. Cattle, when feeding, in addition to turnips and straw, get a limited quantity of cake and grain. Horses work at the rate of 60 acres a pair. The rent has increased much on Mr Joss's holding since 1855, and, considering the present time, it is too high. There is more attention devoted to the breeding and feeding of stock now than twenty-five years ago, but there have been no other noteworthy changes in the system of farming since then.

The Agricultural Depression in Moray and Nairn.

The agricultural depression, which has proved so disastrous in many parts of the country since 1872, has not been so seriously felt in the lower divisions of these counties as in the upper districts, south of the Spey, or in England. Moray and Nairn have lost money—in 1877, in 1879, and again, to some extent, in 1881—but the shortcomings in this respect have been light, especially over the lower half of the counties, compared with the farming financial deficiencies in the south. It would be too much to assume that there are many tenant farmers in Moray and Nairn who are in as good a position, financially, in 1882 as they were in 1876, but a considerable number have not lost more than perhaps a year's rental; whereas, in the southern and central districts of Scotland, the losses since 1872 have been nearer three than two years' rents. Of course, on heavy clay soils, which happily are not exceedingly extensive in Moray, and are nowhere to be met with in Nairnshire, there has been a much heavier drain of farmers' means than is indicated above. On very stiffly rented farms, as well as on badly drained, indifferently managed farms, more especially where working capital has been inadequate, there have also been rather heavy losses in recent years.

Rents—Leases—Rotation—Size of Farms.

Rents.—Over these counties generally, as we have already hinted, there is great variety in the value of land. Rents rise and fall in accordance with the situation and the nature of the soil. Beginning at the most eastern side of Morayshire, we find the rental along the bank of the Spey, from Boat of Bridge to the sea, varying from 10s. to £2, 10s. per acre, the average being about 26s. Along the coast side in the parish of Urquhart, it rises higher in some cases and declines in others. It ranges from 15s. to 30s., and, roughly speaking, the average rental of the district is about 25s. In the parish of St Andrews the rent varies considerably. In the lower parts it ranges from 17s. to 37s., and averages about 25s.; while in the upper end of the parish, where the land is not so heavy and the climate colder, it varies from 12s. to 25s. per acre. The soil in Drainie is stronger and the climate more agreeable, and consequently the average rental of the district is about 25s. or 26s. There is no material increase in the actual value of each acre of land since 1857, but there is a yearly increase in the rental from the feu-duties collected at Branderburgh. As high as 40s. is realised for an acre of very good land. Further west into Duffus, the "Granary of Moray," where the land is valuable and the climate favourable, the rental runs from 30s. to 40s. per acre. On Sir Archibald Dunbar's estate, the average rental is 31s., the highest being 50s. and the lowest 10s. The rentals on some of the farms on this estate are regulated to a small extent by the fiars prices. For example, if the price of wheat is under 42s., £10 is deducted off the rental of one farm; if under 40s., £20 is deducted from another rent; if 55s., another tenant pays £10 of additional rental; if below 48s., £25 is deducted from the rental of another farm; if under 42s., another tenant gets a reduction of £10 from his rent; and if below 42s. per quarter, £10 is deducted from another tenant's rent. The rental of the parish of Elgin is extremely variable. It ranges from 7s. 6d. to 35s. per acre, the average being about 24s. or 25s. Throughout the western seaboard districts of the county of Elgin or Moray rents are much higher than in the eastern parishes. The land is more fertile, and consists of sandy loam and black loam, with a gravelly subsoil. In the Alves, Kinloss, and Forres districts, where wheat is pretty extensively grown and the climate fine, the rents vary from 20s. to 60s. per imperial acre. The average, however, is from 32s. to 40s. In the vicinity of the burgh of Forres, every acre of first-class land costs the tenant 50s. Even more than this is obtained in some cases, some residents in town paying as much as £5 or £6 per acre for conveniently situated land. In Dallas parish the rental varies from 20s. to 30s. per

acre. All over the upper or most inland division of the county, where wheat and potatoes are not grown to any great extent, the agricultural rental falls very considerably. In Edinkillie and Cromdale, there is a great deal of sheep pasture included with arable land, and consequently it is difficult to draw out a correct average, but generally the rent of the arable land would run from 15s. to 25s per acre. Along the fertile valley of the Spey the rents range from 15s. to 30s., except in the Knockando district, where there is a slight decline, the soil being rather thin and the climate uncongenial. Here rents average from 18s. to 20s. In the parishes of Rothes and Boharm rents vary from 15s. to 30s., and average from 24s. to 26s. per acre.

The rental in the lower half of the county of Nairn is similar to that in the eastern districts of Morayshire. It runs from 22s. to 40s., and averages from 25s. to 26s. per imperial acre. In the parish of Nairn it is perhaps fully 26s. on an average; in the parish of Auldearn about 26s.; Cawdor, from 25s. to 32s.; and in Ardclach, where the land is not so fertile and the climate colder, from 5s. to 22s. per acre. In this parish a great extent of hill and rough pasture is rented along with the arable land.

Speaking generally of both counties, we have to report a very significant rise in the agricultural rental. Let us contrast the total rental of each county in 1842 with that of 1880. The total rental in 1842 of Morayshire was £92,818, which in comparison with the rental of 1880, viz., £118,821, shows the vast increase of £26,003, or 38·7 per cent. In Nairnshire the total rental of 1842 was £16,010, and in 1880, £28,788. It will thus be seen that, during the past forty years, the rental of the latter county has been nearly doubled, the increase being £12,778, or 79·8 per cent. Perhaps the following table will show more clearly the substantial increase of the past twenty-five years. It exhibits the increase or decrease per cent. of the agricultural rental of Moray and Nairn during the different periods indicated:—

Years.	*Moray.*	*Nairn.*
1853 to 1863,	1·61	4·52
1863 to 1873,	1·77	1·31
1873 to 1875,	*3·4	·34
1875 to 1877,	1·6	2·10
1877 to 1880,	·6	·65

* The asterisk sign indicates a decrease.

It will be observed that the greatest increase occurred during the decade of 1853-63, which may be attributed to the abnormal advance in prices caused by the Crimean war. The average increase over both counties during the past twenty-five years may be safely stated at 20 or 25 per cent. Some twenty-five or thirty years ago, a number of rents were paid in kind, mostly in

the shape of grain. Latterly, however, all rents have been paid in money, and as a rule are collected at the 26th May and the 22nd November. In some cases they are received in June and December, and in others at Candlemas and Lammas. A hundred years ago the rent of the best farm on the Pitgaveny estate was a boll of oats, a boll of barley, and a boll of wheat per acre of arable land.

Leases.—The majority of tenants on the various estates hold their farms under leases of nineteen years' duration. Perhaps this convenient system of lease has been longer in vogue in these counties than in any other two north of the Grampians. "Life' leases, once very general, are now all but unknown. Crofts are generally held from year to year. Entry in both counties is usually obtained at Whitsunday, when the incoming tenant, as a rule, takes over at valuation from his predecessor grass, fallow, dung, and corn crops. On the Duffus estate the regulations permit of the outgoing tenant disposing of his grain crops *ad libitum.* On the Ballindalloch estates, outgoing tenants are bound to give over to their successors the whole of their last grain crop, the grain at the fiars prices of the county in which the farm is situated, and the straw by valuation of arbiters in the event of no fiars being struck. On these estates tenants nearly always obtain entry at Whitsunday, and the incoming tenant generally takes over first year's grass, grain crops, and thrashing mill at valuation. The regulations and conditions of farm tenancy on mostly all the other estates admit of similar arrangements being made between the outgoing and the incoming tenants. In the regulations of Lord Fife's estate, the following clause is incorporated:—"The valuations of the fallow, grass, and manure shall be made at or before Whitsunday, and shall be payable at that term. The valuations of the grain crops and straw shall be made at such times and in such manner as may be fixed by the arbiters. The incoming tenant receiving the crops and straw, and other subjects of valuation, shall out of the same pay the landlord at the term of Martinmas, on behalf of the waygoing tenant, the whole rents and liabilities then due by him to the landlord. The balance of the value of crops and straw shall be payable by the incoming tenant to the waygoing tenant, at such time or in such instalments as the arbiters may fix, provided that the whole shall be made payable on or before the 15th day of March. On the event of any farm being resumed by the landlord, or in the event of the crops by the waygoing tenant or other subjects of valuation being received by him, or on his behalf, he shall deal with regard to the waygoing tenant as nearly as may be in the same manner as may be provided for by an incoming tenant." In so far as in accordance with good husbandry, the tenants on the Fife estates,

as on several other properties, have liberty to crop the arable land of their farms, during the currency of their leases, in such a manner as they think best, but in all cases they must comply with the regulations of the estate at the termination of the lease. In Nairnshire the regulations of the various estates are almost identical with those in Morayshire.

Rotation.—There is great variation in the system of rotation observed throughout these counties. Five, six, and seven course shifts are quite general, particularly in Morayshire. Taking the two counties together, we find that the five-shift course is the prevailing system; while in wheat and potato growing districts, such as Duffus and Drainie—except when prohibited by the regulations of the estate—the six-shift course is most commonly pursued. The crops in the six-shift course are—First, grass; second, grass; third, grain; fourth, grain; fifth, turnips and potatoes; and sixth, barley laid down with grass seeds. In the five-shifts the crops are thus arranged—First and second, grass; third, grain; fourth, turnips and potatoes; and fifth, barley sown out with grass seeds. The seven-course system is by no means uncommon, although the five and six shifts are more general. In the seven-course system the crops are—Two grasses, oats, potatoes and beans, barley, turnips, and barley again. Two courses of husbandry are in several instances pursued on the same farm, the best land being worked in the six-course shift. In the upper districts of Morayshire and throughout Nairnshire, the five-course system is all but universally adopted. Many tenants, however, are contemplating changing to the six-shift course, which is deservedly gaining favour in both counties. Besides giving three years grass instead of two, as afforded by the five-shift system, it effects a decided saving of labour and manure, is easy to work, and helps greatly to ward off attacks of finger-and-toe and canker, which are frequently very destructive to the root crop. There has been no noteworthy change in the system of farm management further than that indicated as having taken place in the shifts. For several years a great deal of attention has been devoted to the feeding of cattle, which has necessitated a few minor alterations in the rotation of cropping. Beans and pease have given place to turnips and potatoes on most farms, and as will be noticed elsewhere, wheat is rapidly giving place to barley.

Size of Farms.—The lower or maritime districts of Moray and Nairn are broken up into large and moderately sized farms. Here there are few crofts, and in fact, comparatively few holdings under 30 acres in extent, except in the vicinage of towns and villages. The majority of the farms are of medium size, and conveniently laid off. The smaller classes of farms are much more numerous in the upper or hilly districts, where the

soil is pure and the climate colder; and there are a good many crofts in the inland divisions. The subjoined tables show the number of agricultural holdings of various sizes in both counties:—

Counties.	50 acres and under.	From 50 to 100 acres.	From 100 to 300 acres.	From 300 to 500 acres.	From 500 to 1000 acres.	Total.
Moray,	1404	318	271	36	7	2036
Nairn,	214	92	80	4	2	392

In 1870 the number of holdings in the various classes were as follows:—

Counties.	Not exceeding 5 acres.	From 5 to 20 acres.	From 20 to 50 acres.	From 50 to 100 acres.	Above 100 acres.	Total.
Moray,	552	532	378	312	285	2059
Nairn,	53	115	83	91	71	413

Morayshire ranks ninth in Scotland in the first and second of the above classes of holdings, and twenty-fifth in the third class. Nairn stands nineteenth in the first class, second in the second, and twenty-third in the third class.

Buildings, Drains, Fences, and Roads.

Buildings.—As we have already said, the improvements which farm holdings have undergone in these counties since 1857 is immense. Perhaps more new and commodious steadings have been erected within the past twenty-five years than can be said of any other two counties throughout the whole length and breadth of Scotland. There have been improvements effected in this way every year for the past thirty, and now, through the generosity of the proprietors and the industry of the farmers, these counties are exceptionally well supplied with farm buildings. Taking both counties into view, very few dilapidated steadings or farm dwelling-houses are to be seen. The proprietors in some cases erect the necessary farm buildings, the tenant paying 5 per cent. on the outlay along with his rent. In other instances the tenant builds the houses himself, and calculates on obtaining compensation in one form or other. The tenant invariably does the cartage of building material. On the Duke of Richmond and Gordon's estates the landlord affords

half the outlay in buildings, which consist generally of timber and slate, the tenant doing the other half. His Grace also provides his tenants with very large and excellent cottages at an average cost of from £350 to £400, and charges the tenant £3 a-year for them. On the Ballindalloch estates, where many steadings and houses have been built since 1857, the proprietor frequently provides wood and slates for building purposes free of cost, and the tenant bears all other expenses without having any claim for meliorations. Tenants usually pay interest at the rate of 5 per cent. for money advanced for farm improvements. Generally speaking, however, most of the necessary buildings are erected by the landlord at the commencement of the leases without interest, the tenant performing the cartage of all material free. On the Duffus estate the proprietor has erected most of the farm buildings, but in some cases the tenants have built farm servants' cottages, for which they are reimbursed at the end of the lease, according to agreement. The Earl of Moray's estate is exceptionally well provided with excellent farm steadings of good size, and supplied with all modern conveniences. The proprietor erected a great number of them at his own expense, while the tenant had only to provide building material. On this estate servants' cottages, which were erected by the proprietor, are abundant. The Seafield estates are also well provided for, by the proprietor, in the way of building; such improvements being carried out on similar conditions to those on the other estates. The proprietors in Nairnshire have been equally liberal and zealous in the construction of farm buildings. On the Cawdor estate the proprietor has done a great deal in the way of building since 1857. He paid for the cost of erection, and the tenant supplied materials. The Lochdhu estate is also well supplied with superior farm buildings.

Drains.—Nothing affords better proof of the great activity that has characterised the farming industry of Moray and Nairn during the past twenty-five years than the well-drained condition of the farms. In this work the industrious farmers of these counties have had plenty of scope for their energies, while from the landlords they have received substantial assistance. Although the land in Moray and Nairn is to a large extent of a thirsty, sandy nature, draining less or more in every parish has been an indispensable operation. Landlords have done a great deal of draining at their own expense in both counties, besides giving every encouragement for its execution. The combined energy and enterprise of the landlords and tenants in this as well as in other respects have improved the state of their lands very materially during the interval of 1857–82. Some twenty-five or thirty years ago wide open ditches like miniature canals were frequently to be met with in the "Laigh of Moray," and

especially in the low-lying lands of Duffus and Drainie. Now, however, comparatively few of these are to be seen. Low close drains have been sunk, and are proving equally as serviceable as the open ditches. There has been considerable difficulty encountered, however, in obtaining sufficient fall in these low-lying districts for underground drains. On the Duffus estates, the drainage of an unsightly marsh, known as the Loch of Spynie, which had a tendency to check the proper drainage of the districts for a considerable distance around, cost the proprietor, as well as a few of the tenants, great outlay in excavating canals for the drawing away of surface water. This still involves an outlay of £100 a-year to the proprietor, but the canals have been highly beneficial to the drainage of the district. Here the landlord keeps all open ditches clear and in working order, while the tenant repairs covered drains. In the upper parts of both counties there is sufficient fall for a most efficient drainage, and the land is kept in a very fine workable condition. The same system is adopted over the whole of Moray and Nairn. The drains are chiefly laid with tile pipes in the lowlands, but in the upper districts, where the flow of underground water is less, the stone method of laying drains has been pretty extensively adopted. In the lower divisions of these counties, especially of Moray, where the subsoil in some districts contains iron ingredients drains require frequent repairing. They last for a considerable period, however, in other soils. On the Richmond estates the proprietor defrays all expenses involved in the drainage of land, and charges the tenant 5 per cent. of interest. In short, all the proprietors in the counties have very liberally rendered their aid to their tenantry in draining, as well as in all other matters tending to improve the soil. On mossy and sandy soils the average depth of underground drains is as nearly as possible 2 feet 6 inches, on stiff soils 3 feet or 3 feet 6 inches, and leading drains about 4 feet.

Fences.—Wire is the prevailing fence throughout these counties. There has been a great improvement effected in enclosing fields during the past twenty-five years. Prior to 1857 there was scarcely a completely fenced farm to be seen, but now on every estate most secure fences have been erected, partly at the expense of both landlord and tenant. Stone dykes and hedges are the principal fences on a few holdings, but wire in most cases is found to be more suitable and convenient.

Roads.—The counties of Moray and Nairn are well provided with excellent farm, district, and county roads. The length of the turnpike roads in Morayshire is 429 miles 5 furlongs and 214 yards. The total cost of maintenance for 1881–82 was £3989, 8s. 7d., and for the previous year it was £4056, 18s. 7d. The road assessment in Morayshire is 7d. per pound, and in Nairnshire 8½d. per pound.

Grain Crops.

Among the eleven "corn" counties in Scotland, viz., Aberdeen, Banff, Moray, Berwick, Fife, Forfar, Haddington, Kincardine, Nairn, Orkney, and Ross and Cromarty, Moray and Nairn rank eighth and ninth respectively as regards the percentage of the total area under corn. At present the percentage of Moray is 11·8, and of Nairn 6·7; while in the former in 1870 the percentage was 11·7, and in the latter 6·7. In reference to the subjoined table, the number of acres under all kinds of grain crops, at various periods since 1857, will be seen.

Year.	*Moray.* Acres.	*Nairn.* Acres.
1857, . . .	37,065	13,180
1870, . . .	39,678	9,155
1876, . . .	39,974	9,614
1881, . . .	40,157	9,233
Increase since 1857,	3,092	Decrease since 1857, 3,947
„ 1870,	478	„ 1870, 78
„ 1876,	182	„ 1876, 381

These figures show that in Moray there has been a steady increase during the past twenty-five years, but that there has been a decline of 4328 acres in the number of acres under grain crops in Nairnshire since 1857. In both counties there are large quantities of really excellent grain grown. It may be said, if a line was drawn from the extreme eastern to the extreme western point of Morayshire, keeping it at a distance of eight or ten miles from the sea, it would cut away the wheat and barley portion of the county to the north, and have the principal districts for the production of oats to the south. Wheat and barley are the staple crops in the "Laigh of Moray," while the soil in the upper portion of the county, as well as over the whole of Nairnshire, is pre-eminently adapted for raising oats. Barley is also pretty extensively grown in the Braes of Moray, and, in fact, more or less extensively over the whole of both counties. In the parishes of Duffus and Drainie, as well as other parishes, wheat was at one time more plentifully grown than now, but in most districts it has been slowly giving place to barley. Urquhart, St Andrews, Drainie, Duffus, Alves, Kinloss, and Forres are all well adapted for the cultivation of wheat. Winter wheat is sown in the end of autumn, and the other varieties as soon after the middle of the month of March as possible. The grain in the lowlands has for a number of years been sown mostly by machinery. The sowing machines are found to do the work very equally and profitably. The date of harvest varies considerably, but, as a rule, in the lowlands reaping is in full swing by the 1st of September. In inland districts, where the climate

is not so favourable for the ripening of crops, it is generally from a week to ten days later. There is no time of the year that the farmers' duties are more arduous than during the harvest season. The crop is usually cut down with all possible speed, especially in the upper and more exposed districts, in order to prevent it from being shaken by the wind. When the harvest is attended with suitable weather, the crops on many farms are reaped and carted to the stackyard in less than a month. There is always a great demand for harvest hands, who, in some parts, are difficult to obtain. They generally get from 3s. to 4s. 6d. per day. The usual cost of harvesting is calculated to run from 16s. to 21s. per acre. The subjoined are the fiars prices struck at Elgin and Nairn in different years since 1831 :—

Morayshire.

Crops.	1831.	1858.	1865.	1870.	1873.	1878.	1881.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Wheat per imperial qr.,	2 15 5½	2 3 6	2 7 6	2 10 5	2 15 10	1 19 8	2 5 3½
Barley ,, ,,	1 10 10	1 9 7	1 13 0	1 13 4	1 18 1	1 13 1	1 10 7½
Oats ,, ,,	1 0 9	1 1 2	1 4 0	1 2 9½	1 5 8	1 0 0	1 0 7½
Rye ,, ,,	1 11 4	1 6 6	1 8 1	1 8 10½	2 0 11	1 2 0	1 6 11
Peas ,, ,,	1 19 6	1 17 8	2 3 2	2 0 11	2 1 6	2 1 4	1 19 10½
Beans ,, ,,	1 19 6				1 12 0	1 19 2	2 1 5
Oatmeal per cwt.,	0 15 0	0 13 4	0 14 7	0 13 9	0 15 6	0 12 5	0 13 1

Nairnshire.

Wheat per imperial qr.,	2 16 6	2 3 0	2 9 5	2 10 0	2 13 11	1 14 7	...
Barley ,, ,,	1 10 0	1 7 6	1 12 11	1 11 6	1 16 7	1 11 1	1 11 6½
Oats ,, ,,	1 0 0	1 1 6	1 4 2	1 2 3	1 5 7	1 0 0	1 0 6
Barley with fodder,	1 16 0	1 13 6	2 4 0	1 17 6	2 2 7	...	...
Oats ,, ,,	1 9 0	1 9 6	2 0 0	1 10 3	1 13 11	...	...
Oatmeal per cwt.,	0 13 10½	0 13 6	0 14 0	0 13 9	0 15 8	0 12 8½	0 13 7½

The following is a table of the total area under wheat at different periods since 1857 :—

Year.	*Moray.* Acres.	*Nairn.* Acres.
1857,	8749	2062
1870,	5376	266
1876,	3991	109
1881,	2423	1
Decrease since 1857,	6326	2061
,, 1870,	2953	265
,, 1876,	1568	108

As may be inferred from the great decrease in both counties during the past twenty-five years, the wheat crop is not so remunerative as it formerly was. These figures show that the acreage under wheat in Nairnshire has been growing smaller by

degrees, and it is now all but totally abandoned. It need scarcely be doubted that the falling off in the acreage under wheat, in Moray and Nairn as in other wheat-growing counties, has been to a great extent caused by foreign competition. Several farmers, however, gave up the growing of wheat a few years ago in consequence of the returns per acre on their best land having had a declining tendency every successive year. In the eastern portion of Moray the average yield of wheat varies from 3 to 5 quarters per acre; in Duffus, from 4 to 5½ quarters; and in the western districts it, in some cases, reaches 6 quarters, but generally it runs from 4 to 6 quarters. The average weight of wheat over this county runs from 60 lbs. to 63 lbs. per bushel. In the year 1882 the return of the wheat crop was exceptionally good, and in some instances it weighed as high as 67 lbs. and 68 lbs. per bushel. In ordinary years the average price of wheat per quarter may be stated as nearly as possible from £2, 5s. to £2, 10s. Speaking generally, the yield of straw per acre varies from 38 to 42 stones per quarter, for which from 12s. to 16s. is obtained. In respect of the area under wheat, Morayshire stands eleventh in Scotland. When sown by the drill sowing machine from 2½ to 3½ bushels are required, and when sown broadcast from 3½ to 4½ bushels is the usual quantity required to seed an acre. The average prices of wheat, as will be observed by the foregoing table of the fiars prices, have been of a very fluctuating character for a number of years. For instance, in 1871 the average price was £2, 16s. 6d. per quarter; in 1872, £2, 5s. 1d.; in 1877, £2, 4s. 4d.; in 1879, £2, 6s. 10d.; and in 1881, £2, 5s. 3½d. It has been selling far too cheaply to pay the farmer for several years. For the past five years the average price for wheat weighing 62 lbs. has been something like 45s., whereas 50s. would be required per quarter in order to pay the cultivator. Wheat is commonly grown after turnips, although in many cases after grass, when a liberal supply of farm-yard manure, say from 25 to 35 loads per acre, is applied.

The following table shows the extent of land under barley and bere at the various periods indicated:—

Year.	*Moray.* Acres.	*Nairn.* Acres.
1857, . . .	10,004	3269½
1870, . . .	11,815	2237
1876, . . .	13,093	2821
1881, . . .	14,216	3055
Increase since 1857, .	4212	Decrease since 1857, 214½
„ 1870, .	2401	Increase since 1870, 818
„ 1876, .	1123	„ 1876, 234

It is gratifying to learn from these figures, that while wheat

has been diminishing in these counties during the past twenty-five years, barley has been increasing, at any rate in Morayshire, to a corresponding extent. It will be observed that between 1857–70 there was a decrease in the area under barley in Nairnshire to the amount of 214 acres, but this may be attributed to the fact that at that time the cultivation of wheat received much more attention from the farmer than it has done in recent years. Moreover, a good many farmers in the upper reaches of the county have been devoting more attention to sheep farming during the last twenty-five or thirty years. It will be also seen that the area in Nairn, as well as in Moray, devoted to the cultivation of barley, has substantially increased since 1870. This is, doubtless, in a great measure owing to the reduction in the quantity and value of wheat grown. In the lower half of both counties barley is the staple, and most remunerative cereal, the yield and quality, after a fairly good ripening season, being as a rule excellent. Some farmers are of opinion that barley will not long continue to be the best paying cereal if it remain as low in price as it has been for some months. It is usually sown at the rate of from 3 to 4½ bushels per acre, from the second week of March to the third week of April. In the later districts it is often sown earlier if weather and circumstances permit. The annual return per acre ranges from 4 to 6 quarters, and on an average about 4½ to 5 quarters per acre. The average weight per bushel varies greatly, but in good years it ranges from 53 lbs. to 58 lbs. The average return over the whole of both counties is pretty nearly 56 lbs. per bushel. After a year of strong sunshine, 60 lbs. per bushel of thoroughly matured barley is by no means an uncommon weight. As a rule, from 18 to 20 stones of straw is returned for each quarter of grain, and the total value of an acre of barley runs from £7, 10s. to £9. In regard to the area under barley, Morayshire ranks eighth among Scotch counties, and Nairnshire stands fourteenth. The principal varieties of barley grown are—Chevalier, common, St Medoes, and Norfolk, but the former two kinds are perhaps most extensively cultivated. Barley is generally grown after turnips, and sown with broadcast or drill sowing machine.

The total acreage under oats at various periods since 1857 is given in the following table:—

Year.	*Moray.* Acres.	*Nairn.* Acres.
1857, . . .	17,213	7346
1870, . . .	20,872	6089
1876, . . .	21,668	6161
1881, . . .	22,623	5897
Increase since 1857, .	5410	Decrease since 1857, 1449

Throughout the upper districts oats are the most suitable cereal for the soil and climate, and in these parts they are, doubtless, the mainstay of both Moray and Nairn. In 1857 Morayshire stood seventeenth among Scotch counties in regard to the acreage under oats, Nairn ranking twenty-seventh. At present Moray ranks sixteenth and Nairn twenty-fifth. After a dry summer a light crop of straw on the sandy parts of these counties is generally experienced. On the more retentive soil of the inland localities it is not so easily affected by drought; but, on the other hand, the crop there has a tendency to suffer from excess of moisture. The quantity of seed allowed per acre varies considerably. On the stiffer lands more seed is required than on the ordinary light mould. From 34 to 36 bushels is about the average return in the upper districts, while over the "Laigh of Moray" and the lowlands of Nairnshire from 36 to 46 bushels per acre is perhaps slightly, but not materially, over the general average. Throughout the whole of both counties the weight runs on an average of from 40 to 43½ lbs. per bushel; it exceeds 45 lbs. in exceptional cases. The return of straw varies with the seasons, but for every quarter of grain from 23 to 25 stones, or from 12s. to 16s. worth of straw, is obtained. From 3 to 4 bushels of grain is calculated to sufficiently seed an acre, and, generally speaking, the value, including straw and grain of each acre's return, would range from £8 to £9, 10s. Perhaps more than £10 is obtained in some exceptional cases. English birley, sandy, potato, pedigree, and early Angus oats are the varieties most largely grown. Sowing is the leading operation from the middle of March to about the 20th of April. Oats are grown after lea turnips and potatoes, and sometimes two successive crops of oats are taken. This, however, depends on the rotation under which the farm is worked. The five-course shift holds sway throughout the upper districts of Moray and Nairn, and to prevent the consequent diminution of the cereal crops, artificial manure has often to be applied to them, as well as to the turnip crop.

Rye, Beans, and Pease.—In 1857 the acreage under rye in Morayshire was 766. and in 1881, 805, which shows an increase of 39 acres. On some of the poorer soils there are considerable stretches of it grown in both counties. There has been a very much larger decrease in the extent of land under beans and pease in Moray during the past twenty-five years than there has been of an increase in the acreage of rye. In 1857 there were 153 acres under beans, and 56 in 1881, thus showing a decrease of 97 acres. The extent under pease in 1857 was 181 acres, and 33 acres in 1881, which shows a falling off of 148 acres. In Nairnshire there has been a very significant decline alike in

rye, beans, and pease. There were 356 acres under rye in 1857, and last year there were only 260 acres, which shows a decrease of 96 acres during these years. Of beans there were 9 acres in 1857, and 4 acres in 1881. There were 138 acres of pease in 1857, and 16 in 1881, showing a large decrease of 122 acres.

Hay, Grass, and Permanent Pasture.

The extent of hay and grass under rotation at various periods since 1857 is as follows:—

Year.	*Moray.* Acres.	*Nairn.* Acres.
1857, . . .	28,560	10,810
1870, . . .	34,041	8,098
1876, . . .	38,667	9,973
1881, . . .	38,670	10,057
Increase since 1857, .	10,110	Decrease since 1857, 753
„ 1870, .	4,629	Increase since 1870, 1,959
„ 1876, .	3	„ 1876, 84

The above table indicates a very noticeable increase in the area under grass since 1857 in Moray, while there has been a considerable decline in the number of acres under grass in Nairnshire. The increase in Morayshire is in a great measure, if not wholly, accounted for by the fact, that a large extent of land, formerly worked on the five-shift course with two years' grass, is now being farmed in six shifts with three years' grass. This change, as already indicated, has been brought about mainly by the greater liability of turnips in the five-shift course to suffer from finger-and-toe than those grown in the sixth-shift rotation. A heavier crop of roots is, as a rule, obtained in the six than in the five-course system. The five-course shift prevailing over Nairnshire accounts for the decrease of 753 acres since 1857. The six-shift was more common some thirty years ago than at present. The yield of hay is very irregular, and more particularly on light land. A deficiency of clover is frequently experienced after a very dry season. In 1880, for instance, on account of the dry scorching nature of the weather in the middle of summer, the return of hay varied from 10 to to 30 cwt. per acre. This applies to both counties. The parishes of Duffus, Drainie, and Alves are the best hay-producing districts. In the former as much as 250 stones (22 lbs. per stone) per acre are grown in good seasons. The average quantity of hay returned per acre in Morayshire, in ordinary years, according to the calculations of a few judicious valuators, is about 145 stones. The average value of hay is, as nearly as possible, 1s. per stone, or £7, 5s. per acre. The quantity of rye-grass seed allowed to each acre runs from 14 lbs. to 22

lbs.; and clover, of which there are different varieties, from 6 lbs. to 11 lbs. In regard to the extent of land under grass, Morayshire stands twelfth, and Nairnshire thirtieth in Scotland.

Permanent Pasture.—There is a remarkable decrease in the acreage under permanent pasture or grass, not broken up in rotation, exclusive of heath and mountain land, since 1854. At that date there were 16,105 acres in Morayshire, and now there are only 5611. In Nairnshire the area was 9833 acres in 1854, and in 1881, 2149 acres.

Root Crops.

Turnips.—The area under turnips at different periods since 1857 may be given thus :—

	Moray.		*Nairn.*
Year.	Acres.		Acres.
1857,	12,737		4678
1870,	15,660		3975
1876,	16,549		4159
1881,	16,659		4102
Increase since 1857,	3922	Decrease since 1857,	576

The figures show a perceptible advance in the cultivation of turnips in Morayshire, and a gradual but observable decrease in acreage devoted to this crop in Nairnshire since 1857. Turnips have been coming more into favour among Morayshire farmers every year. We have already alluded to the important fact of changing the rotation of many farms from the five to the six-shift course, in consequence of the tendency of the turnip crop to be attacked by finger-and-toe. Moreover, the six-shift rotation entails less cost, both in labour and manure, than the five-shift course. With the six-shift course the land gets a longer rest from turnips than in the five-shift rotation, and therefore the crop is supposed to be more vigorous and better able to protect itself from the disease; a change to the six-shift would thus seem advisable. In favourable years a heavy crop of turnips is generally raised. The roots, as a rule, are very superior in point of quality. Swedes are extensively cultivated, being the most nutritive and best for feeding cattle. The yield of turnips varies from 14 to 25 tons per acre; in exceptional cases as much as 27 and 30 tons are returned. The value per acre of good turnips, when carted off the farm, varies from £8 to £10, which is at the rate of from 9s. to 12s. per ton. When turnips are consumed on the farm by sheep, the average cost per acre is reduced to from £6 to £7, it being calculated that sheep, while netted on the turnips, manure the land to the value of £2 per acre. If consumed by cattle on the holding, a little more money is obtained than when eaten by sheep. Generally

speaking, swedes are from £2 to £3 per acre more valuable than yellow turnips. The majority of farmers sow their turnip seed above a liberal supply of farm-yard manure and an admixture of artificial stimulants. We have previously specified the quantities given to the acre on the leading farms. Turnips are generally sown from the 10th of May to the second week of June. About 2 lbs. of yellow turnip seed is the general allowance per acre, and about 3 lbs. of swedes. The drills are usually from 27 to 29 inches wide. Singling commences in the latter end of June, when there is a great demand for day labourers. The plants are generally left from 8 to 10 inches apart. In the fall of the year a comparatively small proportion of the root crop is stored in low-lying seaboard districts. In inland localities the winters are, as a rule, too severe for leaving roots in the ground after the middle of December, and consequently farmers are obliged to store them. When severe frosts prevail, and especially in the absence of snow, the root crops in the lowlands are frequenty more or less damaged. Most lowland farmers furrow up land to the drills at the approach of winter, but this system is not sufficient to fully protect the roots from the effects of frost, although it favours the development of the bulbs during winter. It would undoubtedly be advantageous if a much larger portion of the crop was stored early in the season. Some store their roots in pits in the fields, and others drive them to the farm steadings and store them there. In regard to the extent under turnips, Morayshire stands ninth and Nairnshire twenty-fifth in Scotland.

Potatoes.—The following table gives the area under potatoes at various periods since 1857 :—

	Moray.		*Nairn.*
Year.	Acres.		Acres.
1857,	3190		1407
1870,	3711		676
1876,	3005		659
1881,	3516		699
Increase since 1857,	326	Decrease since 1857,	708

An extraordinary decrease thus appears in Nairnshire, being more than half the acreage of 1857. Then the potato trade, like the growing of wheat, was much more flourishing and remunerative than it has been in recent years. The greatest decrease, it will be observed, occurred between 1857 and 1870. The increase in Morayshire is by no means remarkable, considering the suitability of the lower half of this county for the cultivation of potatoes, the great convenience as regards railway communication, and the proximity to the seaports, &c. The yield of potatoes varies with the nature of the soil and other

conditions. Except to farmers in close proximity to a railway station, potato farming has not been very profitable for a number of years. In 1740 the potato was introduced into this part of the country, and was then regarded only as a luxury. The esculent was cultivated with care in the most favoured situations of the garden, and served along with fruit at the table of the opulent as a vegetable of the greatest delicacy. Now, potatoes form a large portion of the food of the poorest classes. In the upper divisions, and, in fact, on a number of farms in the lower sections of these counties, potatoes are grown only in such quantities as are required for home consumption. The best yield is not always obtained from the best land, but, on the contrary, it sometimes happens that the heaviest crop is grown in light soil. This is regulated to a large extent by the season. On farms where a great quantity of potatoes is grown, the planting and lifting operations entail great labour. They are usually planted from the middle of March till about the third week of April, from 10 to 13 cwt. of seed being allowed to each acre. Potatoes receive similar treatment to swedes, being liberally stimulated by both farm-yard and artificial manures. Not a few farmers spread the farm-yard manure over the stubble-ground, and plough it down in the autumn, but in the majority of cases the dung is driven straight from the court and spread along the drills in spring. Potatoes are grown after oats and lea. When they are grown after lea, less dung is applied than when planted after oats. In some cases dung alone is given, and in exceptional instances the crop is laid down solely with artificial manure. Disease sometimes plays great havoc with this crop, and on the large farms, in potato-growing districts, a considerable loss is sometimes sustained. When prices are good and the demand fair, the potato crop is one of the most speculative of all the farm crops grown in these counties. The average yield over both counties runs from 3 to 6 tons per acre, and the lowest profitable selling rate is about £3 per ton. The price, however, has been much under this for a few years. At present, for instance, a ton of good potatoes could be purchased at from £1 to £1, 10s. For some time past there has been great stagnation in the potato trade, and consequently there is no profitable outlet for the abundant crop of 1881. The varieties most extensively cultivated are Regents, Victorias, Champions, and Blues. The crop of 1882 is universally good in these counties, both in respect of quantity and quality, but disease has broken out, unfortunately, in some parts. When potatoes are unusually cheap, as they have been for the past year, many farmers use them as food for cattle and horses. As potato-growing counties, Morayshire ranks sixteenth, and Nairnshire thirty-first, in Scotland.

Other Green Crops and Fallow.—In 1857 the area under all other varieties of green crop was 838 acres, made up of 12 acres of mangolds, 3 of carrots, 28 of cabbage, 2 of rape, 100 of turnip seed, 409 of vetches, and 284 of bare fallow in Morayshire, and 2 acres of mangolds, 3 of cabbage, 11 of turnip seed, 125 of vetches, and 90 of bare fallow—making a total of 238 acres in Nairnshire. The extent in 1881 was, mangolds 15 acres, carrots 2, cabbage and rape 5, vetches, &c., 487, and bare fallow 105—in all, 614 acres in Morayshire. In Nairnshire there were, vetches, &c., 40 acres, and bare fallow 79—making a total of 119 acres. It will be observed that there is a considerable reduction in the number of acres under bare fallow since 1857, in both Moray and Nairn. Vetches are extensively used in both counties for the feeding of cattle, when grass gets scarce in the end of the grazing season, and before the turnip crop is ready.

Cattle.

The number of cattle of the different classes in the two counties at various periods since 1857 is shown in the following table :—

Morayshire.

Year.	Cows and Heifers in Milk or in Calf.	Two Years Old and upwards.	Under Two Years old.	Total.
1857,	5985	12,031	5,215	23,231
1870,	6993	4,147	11,481	22,621
1876,	7437	4,510	12,923	24,870
1881,	6869	4,343	13,029	24,241

Total increase since 1857, 1010.

Nairnshire.

Year.	Cows and Heifers in Milk or in Calf.	Two Years Old and upwards.	Under Two Years old.	Total.
1857,	2422	4648	1895	8965
1870,	1685	1007	2814	5506
1876,	1888	1279	3276	6443
1881,	1784	924	3351	6059

Total decrease since 1857, 2906.

In the returns of 1857 the class under "two years" comprises calves only.

These tables exhibit great irregularity in the total numbers of cattle in each of the four years mentioned. Between 1857 and 1870 there was a decrease of 610; between 1870 and 1876, an increase of 2249; and between 1876 and 1881, a decrease of 629 in Morayshire. Notwithstanding the alternate rise and fall in the total numbers since 1857, there is, taking all in all, as will be observed, an increase of 1010. In Nairnshire, however, the movement has been in the opposite direction. There is a total decrease of 2906 since 1857. Excepting a temporary attack of cattle disease in some parts of Morayshire in 1876, Moray and Nairn have long enjoyed almost perfect immunity from cattle disease of any kind. Even in that year the loss was not extraordinary, although several tenants sustained considerable damage in their stock. In 1876 the number of cattle visibly decreased, and in 1877 the total number was only 23,689, being 1181 fewer than in the spring of the previous year. For a time the movement of stock from one county to the other was strictly prohibited. The disease was scarcely felt in Nairnshire. So much seems to have been done prior to 1857 in the direction of improving cattle in these counties, that comparatively little room was left for improvement since then. It may be stated, however, that farmers have been more careful and considerate in selecting their breeding stock for some twenty years past than they had formerly been. This has undoubtedly conduced to a more perfect and profitable system of stock rearing. The general stock of cows partakes largely of the shorthorn stamp, although many farmers have excellent stocks of black polled cows. Well-bred polled and shorthorn bulls are almost the only sires used. The most popular system of breeding is to mate the polled bull with cross cows, but in numerous instances shorthorn bulls are used amongst polled as well as cross-bred cows. As a rule, the choicest animals are derived from the former union. Farmers are careful to select well-bred sires, and must also have good forms and character, as well as good pedigrees. Over the lower half of Moray and Nairn the fattening of cattle deservedly receives more attention than it did twenty-five years ago. There has been a great increase in the number of fat cattle annually turned out on almost every lowland holding since then. In the upper districts farmers breed cattle much more extensively than those in the lowlands, in consequence of these districts being better adapted for breeding and rearing than fattening. Lowland farmers, as our report has already showed, generally, in autumn buy in lean stock, mostly from one to two years old, from the upper districts, and fatten them during the following winter. Most farmers in the lower districts find this buying-in

system to be more profitable than home breeding. Perhaps this has been the best paying system in recent years, when good store yearling cattle were to be had at moderate prices; but it is now believed, since store cattle have become very scarce and dear, that tenants in the lowlands would find it advantageous to breed more cattle than they do. On farms that are well sheltered, attached to a stretch of permanent pasture, and in which there is good and comfortable court accommodation, which most of the more modern steadings have, the breeding of cattle might, with profit, be carried on. No doubt the manure made by young stock is not so rich or efficacious in maintaining the fertility of the soil as that made by feeding cattle, but this would be made up for in other respects. In the fall of the year Irish calves or stirks are usually abundant in this part of the country, and can be bought at from £5, 10s. to £8. These, as a rule, pay the feeder remarkably well. Except those in the vicinity of towns or villages, where milk can be profitably sold, few farmers who are not extensive cattle breeders keep more cows than supply milk for the farm. In many cases two suckling calves are reared by one cow. There are a good many pure-bred herds of no small celebrity in Morayshire, which shall be noticed hereafter. As to the number of cattle, these counties rank seventeenth and thirty-first respectively in Scotland. It is necessary to mention that the buying-in system so extensively pursued exclude hundreds of animals from the above tables which are fed within these counties. On nearly all the principal farms there is at least one commodious cattle court, and in a great many of the recently erected farm steadings there are two, partially roofed with slates. They are usually of sufficient size to accommodate from eight to sixteen cattle, and in several instances even more. Where there are two courts, one is occupied by cattle nearly ready for the slaughter-house, while the leaner stock are kept in the other, until the fatter ones are sent away, when the half-fed animals are transferred into their fold, thus making room for an additional contingent of lean stock. It is the aim of most farmers to have the lot of cattle destined for court-feeding pretty equal in size, in order that they might share equally in the food provided for them. Polled cattle are found to agree better than horned cattle while feeding in folds, but both kinds thrive very well, when well bred.

Cattle Feeding.—The general custom is to take cattle intended for fattening off the grass immediately after harvest, at which time they are usually in good condition. They are tied up and fed liberally with vetches and straw, and a moderate supply of turnips. They are gradually brought on to turnips, which, after a short time, along with straw, are fully supplied, forming the staple food during winter. Much care and attention are devoted

to the regular feeding of stock. After the feeding cattle are a short time on yellow turnips, a mixture of swedes and yellows is given, and thus the animals are gradually accustomed to the richer variety of roots. The gradual change prevents any disarrangement or check which might result from a sudden transition from one kind of food to another. Many farmers give cake or bruised grain all winter along with turnips and straw or hay, beginning with a pound or two per head per day, and increasing the allowance to 3, 4, or perhaps 5 or 6 lbs., as the animals approach maturity. A great many, however, give no artificial food, except during the last six weeks or so, when they give 2 or 3 lbs. of oilcake and 2 or 3 lbs. of bruised grain, generally oats, Indian corn, or rye, to each animal per day. Some farmers use large quantities of pulped food, consisting of cut turnips, straw, and chaff, along with some artificial material, all fermented together. It would be well, we think, if this system of preparing food were more extensively pursued. Cattle put up to be fattened receive at the outset from 70 to 100 lbs., or perhaps more, of turnips per day, with about 1 lb. of cake and corn. As the animals progress, the allowance is curtailed to from 60 or 80 lbs. per day, when the supply of artificial stuffs is increased to several pounds. The earlier housed animals are usually ready for the Christmas markets, when two-year-olds weigh from 6 to 8 cwt. Fat cattle come into the market all through the season, from Christmas to May, when three-year-old heifers, prime fat, weigh from 5 to 7 cwt, and stots from 6 to 9½ cwt. each. Young cattle, during the winter, principally subsist on turnips and straw. The selling rate of fat cattle varies very considerably. In 1857 the average rate per cwt. was from 64s. to 66s.; in 1872, 78s. to 82s.; and in 1881, from 72s. to 74s. In the spring and summer of 1882 it rose greatly, and at different periods during these two seasons it exceeded 80s. per cwt.

Horses.

While there has been vast improvement effected in the breeding and rearing of cattle in these two counties during the past twenty-five years, the breeding and rearing of horses have also received increased attention. The desire to improve the breed of horses seems to have sprung up about 1820, and for many years good streams of Clydesdale blood have been playing freely within these counties. There are many excellent horses of pure-bred Clydesdale blood to be met with in the lowlands, but there are also many animals of a mixed breed. It is desirable, however, that farmers should be still more careful in the selection of stallions. The stock of mares is good, and when mated with high class Clydesdale sires seldom fail to

produce excellent stock. The number of horses in these counties at various periods since 1857 is given in the following table:—

Year.	*Moray.*	*Nairn.*
1857, . . .	5024	1932
1870, . . .	4505	1123
1876, . . .	4873	1220
1881, . . .	5124	1291
Increase since 1857,	100	Decrease since 1857, 641

The total increase between 1857 and 1881 is 100 in Morayshire, but it may be mentioned that in 1880 there were 62 more horses than in 1881. This decrease of 62 in one year may be accounted for by the fact that there were fewer foals in Morayshire last year, owing, doubtless, as much to the agricultural depression as to the great stagnation in the horse market. In recent years the demand for agricultural horses has been too slow, and prices too small to compensate the breeder. The very material falling-off in the number of horses in Nairnshire since 1857 is partially traceable to the already mentioned fact that sheep farming is gradually gaining ground in the upper districts. Not a few Clydesdale mares have been imported to this county for breeding purposes, yet horse breeding has been carried on to a very limited extent. The number of acres allotted to each pair of horses varies in accordance with the soil. In the lower half of both counties a pair of strong active horses work from 65 to 80 acres; while in the higher districts, where the soil is stiffer, from 50 to 60 acres is the general allotment. It must be admitted that though Moray and Nairn are on an equal footing with most other Scotch counties as regards the character of their horses, there is still room for improvement in this class of farm stock. In respect of the number of horses, Morayshire stands eighteenth in Scotland, while Nairnshire ranks twenty-eighth.

Pure Bred Herds of Polled and Shorthorn Cattle.

Numerically, the pure bred herds of cattle in the counties of Moray and Nairn are of secondary importance to those of many other counties in Scotland, but they occupy a high position in respect of merit. Both polled and shorthorn herds are here and there to be met with, and happily there are prospects of both breeds becoming more popular in the future. The existing herds are of a very rich and meritorious character, possessing, it may be said, all the characteristics—contour, quality, and symmetry—that adorn the respective breeds. The shorthorn blood is undoubtedly most thickly disseminated in Morayshire; but, taking all in all, the black polled breed is perhaps the best in point of quality. These are the direct descendants of the

ancient "Doddies" and Buchan "Humlies," the native polled cattle of the north-east of Scotland. Almost every large farmer in Morayshire has at least got one specimen of the shorthorn breed in his possession, and there is invariably a close and keen competition at local shows.

Polled Cattle.

Black polled cattle are found to be well adapted for cold and late climates, being hardier than any other breed excepting the shaggy-coated Highlanders. The first eminent breeders of Aberdeenshire cattle in Morayshire were—Messrs Brown, Westertown; Collie, Ardgay; Paterson, Mulben; and Sir George Macpherson Grant, Bart., M.P., of Ballindalloch. The first-named gentleman was a well-known judge of polled cattle, and his animals, through careful breeding and judicious feeding, stood invincible in large competitions. Mr Brown was about the first to introduce the breed into this county. Mr Paterson was also a successful breeder. He commenced to breed in 1846. A celebrated cow, "Mayflower," representing his herd, carried the first prize at the Highland Society's show at Perth in 1861. He had also a bull, "Prince of Wales," bred by Mr Brown, which was first at Aberdeen and Stirling. "Mr Collie (says Mr M'Combie) was one of the most dangerous men to face in the showyard I have ever encountered." Mr Collie's herd had a famous showyard career; and the ox which gained the Smithfield prize, exhibited by Mr M'Combie, Tillyfour, in 1864, was bred by him. These herds are now extinct, except Sir George Macpherson Grant's, which is by far the oldest in the north—as it is said to have been in existence as far back as 1820—and it has never been more flourishing than at present.

Ballindalloch Herd.—It appears that the history of the origin of the Ballindalloch herd has been lost in a cloud of antiquity, and no record by which it can be ascertained when the herd was founded has been kept. In the year 1850 Sir John Macpherson Grant, father of the present proprietor, purchased two celebrated animals, viz., "Matchless," at £30, and "Victor 2nd" (47), at £20, at the Tillyfour sale of pure-bred cattle. Although Sir John was careful in his selections of stock, it was not until 1861, when the herd came under the management of its present owner, that its improvement received full attention. From that year it has advanced steadily, until it has attained a degree of perfection which most herds never reach. No better proof of its vast improvement, since the herd first began to engage the attention of the present baronet, can be had than that afforded by the result of local exhibitions. In 1861 only four first and two second prizes were gained by its representa-

tives; while in 1879 and 1880 they won no fewer than forty-two first prizes, four special money prizes, thirteen cups, seven medals, and eighteen second prizes. Sir George's first purchase was "Erica" (843), which he acquired at the Earl of Southesk's sale in 1861 for fifty guineas. Another exceedingly valuable cow, "Jilt" (973), was bought from Mr M'Combie, Tillyfour, in 1867, for seventy guineas. She won the second prize at the Royal English Agricultural Society's show at Newcastle, and also the second at the show of the Highland and Agricultural Society of Scotland in 1865. "Sybil" (97), which won the first prize at the show of the same Society at Dumfries in 1870 was purchased for sixty-three guineas at the Castle Fraser dispersion sale. The principal additions that have been made since then were "Pride of Mulben" (1919), purchased at Mulben in 1876 at ninety-one guineas; "Kindness of Ballindalloch," purchased at Drumin in 1873; "Rose 3rd," purchased at Westertown in 1874; "Madge 2nd" (4180), bought at Aboyne, 1879; "Kate Duff," obtained from Rothiemay in 1881 for 155 guineas; and "Blackbird 3rd" (766), selected from the famous Gavenwood herd. The earlier sires were "Craigo" (260), after a Balwyllo bull, and out of a cow bred at Keillor; and "King Charles" (236), bred at Southesk, after Druid (225), and out of Cathleen (339); "Trojan" (402), purchased at the Tillyfour sale in 1865 for fifty guineas, an animal of very great excellence was next introduced into the herd. He was after Black Prince of Tillyfour (366), and out of the Paris cow, Charlotte (203). He won the first prize as a yearling at Stirling in 1864, while he won the leading ticket at the Morayshire Farmers' Club show at Elgin in 1865. According to a private catalogue, "Trojan" did more good to the Ballindalloch herd than any other bull that has been in it. He was undoubtedly the first bull that gave the females the characteristics by which they came to the top in a few years after his advent, and brought out fully the special features that make the Ballindalloch type so popular with the public. Subsequent sires used were "Victor" (493); the champion bull "Juryman" (404), bred in the herd, after Bright (454), and out of Jilt (973); "Scotsman" (474), bred at Tillyfour, out of Zora (1228), and after Jim Crow 3rd (350); the Erica bull "Elchies" (263), sire Juryman, dam Eisa (977); the Erica bull "Elcho" (595), sire Juryman, dam Erica (848); and "Judge" (1150), which won the gold medal at Paris in 1878, after Scotsman, and out of Jilt. "Trojan," "Victor," "Elchies," "Juryman," "Elcho," and "Judge" were the most valuable stock bulls. This celebrated herd is noticed at considerable length in Macdonald & Sinclair's recently published volume on the *History of Black Polled Aberdeen or Angus Cattle.* The herd

at present (according to a private catalogue) contains eighty-one females, representing sixteen different families. The great attraction in the herd has long been, and still is, the Erica family, of which there are twenty-eight cows and heifers, headed by the famous Highland Society prize cow "Eisa" (977), and "Eva" (984), the former now in her sixteenth year, and the latter in her twelfth. The next family are the Jilts from Tillyfour, of which there are five females, including "Juno" (3374), the third prize cow at Glasgow this year (1882). Then follow in the catalogue ten cows and heifers of the Pride branch of the Queen tribe, headed by those magnificent cows "Pride of Mulben" (1919), and "Kindness" (1412), ten and eleven years respectively, and breeding remarkably well. The next family are the Lady Fannys, which number twelve cows and heifers. The Miss Burgess family, if not very long pedigreed, are true breeders, and thick, well-furnished cattle. They are represented by three cows and heifers; the Nosegays, of good old material, by the same number; the Westertown Rose family by four; the Rothiemay Georgina family by three; the Tillyfour Nymph family by two; the Bogfern Sybil family by one—"Sprite," the second prize cow at Glasgow this year. The other families, represented mostly by individual animals, are the Coquette, the Heather Blossom, the Madge, the Blackbirds, the Marias, the Strathmore, Beauty, &c. The bulls at present in service are the 225 guinea Erica prize bull "Young Viscount" (376), the first prize Highland Society's Jilt bull "Justice," the cup winner at Aberdeen and Inverness this year. Sir George refused the very tempting offer of £1000 by Lord Dunmore at the recent Inverness show for this famous animal. The two-year-old Jilt bull "Julius" (1819), winner of the fourth prize at Glasgow this year; the Bride bull "Petrarch" (1258); and the Erica bull "Sir Evelyn," which won the second prize this year at Glasgow, besides a number of first prizes in the north.

Mains of Advie.—In Strathspey there are several very fine herds of Aberdeenshire cattle. A herd of this breed was founded at Mains of Advie some twenty years ago by the late Mr Charles Grant, farmer. Mr Grant's original purchase was "Old Rose of Advie" (3104), after Craigo (260), and out of a pure Aberdeenshire cow. "Old Rose" in the same year she came to Advie produced a heifer calf by the Southesk-bred bull King Charles (236). This calf was named "Rose of Advie" (3105), was the dam of "Dandy of Advie" (3106), after the Queen bull Trojan (402), bred at Tillyfour after Black Prince. "Dandy," now fifteen years old, turned out one of the finest cows of the breed. Besides being a grand specimen of the massive, short-legged, wealthy-fleshed, beautifully-haired cows, she is an excellent breeder. The class of cattle reared by Mr Grant since

the nucleus of the herd was formed has been the envy of breeders throughout the country, and most successful in showyard competitions. Owing to the death of the originator of the herd, Mr Charles Grant, it was dispersed on the 3rd October 1882, and the prices obtained were—

No. of Animals.	Average.	Total.
14 Cows, ...	£118 17 6	£1664 5 0
4 Two-year-old heifers, .	79 0 3	316 1 0
9 Yearling heifers, . .	78 3 4	703 10 0
12 Heifer calves, . . .	66 17 0	802 4 0
1 Aged bull, . . .	...	147 0 0
2 Bull calves, . . .	34 13 0	69 6 0
42 Head averaged . . .	£88 3 0	£3702 6 0

Mains of Aberlour.—The nucleus of the distinguished herd of pure bred Aberdeenshire cattle, the property of Mr William Robertson, Mains of Aberlour, was formed in 1842 by the purchase of two cows, by the present Mr Robertson's father, from the then celebrated black tribe at Dandaleith. Through the intimacy of the late Mr Robertson with the late Mr M'Combie of Tillyfour, and through several transactions which he had with him, a good deal of the "Tillyfour blood" was infused into this herd in its infancy, which, combined with the fact that a good many of the young stock had sprung from Ballindalloch tribes, soon brought Mr Robertson's herd prominently into notice. Herd books were unknown for some considerable time after the commencement of Mr Robertson's herd, and we consequently lack sufficient data for going fully into the early history of the cattle. The first cow registered was "Susan" (166), the daughter of which "Belle" (631) was sold to Mr Adam Sweethillock, in whose name she was exhibited, and carried the first prize at the Morayshire Farmers' Club show. From its earliest days the herd has contained many excellent specimens of the breed, and its representatives gained an enviable reputation at local exhibitions. In 1856, at the first show of the Spey, Avon, and Fiddochside Farmers' Society, Mr Robertson's cattle took a high position against representatives of the herds of Ballindalloch, Drumin, and Mulben. An excellent bull, bought from the late Mr M'Combie in 1846, very much improved the stock. "Windsor 2nd" (812), bred by the late Mr Brown, was a superior animal, and gained many valuable prizes before coming into Mr Robertson's possession. His sire was Windsor (221) which was sold at £180, and his dam Lady Ann (307), bred at Tillyfour, and out of a cow which carried the first prize at the Highland Society's show. The character of

the herd has been maintained since it came under the management of the present owner, although the animals have been seldom shown. Marked with great purity and excellence of outline, cattle from this herd have won prizes at both local and national shows. One important point is well sustained in this herd which should be the aim and object of all breeders to retain, and that is the milking properties of the cows. The first bull purchased by the present owner was "Marius" (564). He gained the first prize at the Highland Society's show in 1865. The next purchase was "Bognie" (513), bred by Mr Morison of Bognie, and having been subsequently sold to Mr M'Kessack, Earnside, carried first prizes at Elgin, Nairn, and Inverness shows. He was succeeded by "Jester" (472), bred at Ballindalloch, and being out of Jilt, was half brother to the famous trio of bulls, Juryman, Judge, and Justice. He gained a large number of prizes. "Jestia" (798), was bred at Drumin, and was stock bull for one year. He almost conquered wherever he was shown. The celebrated bull "Cluny" (1285), bred at Ballindalloch out of the fine cow Erica, which was second at the Paris Exhibition, and the winner at several other shows, was bought by Mr Robertson. The bulls used in the herd during the past five or six years were "Morayston" (1439), out of the prize cow Forget-me-not (1685), and after Adrian (622); "Souter Johnny" (1615), out of Moonlight (1479), and after Ardrian 2nd (622); "Whig" (1867), a pure-bred Erica bull, recently sold to Major Smith, Minmore, at 100 guineas, out of Elma (3368), and after Editor (1460). The present stock bull is Paris (1473), which won the first prize at the Paris Exhibition in 1878. At present the herd consists of 39 females, 2 bulls, and 4 bull calves, containing specimens of the Ballindalloch Jilt family, the Ballindalloch Ericas, and the Drumin Lucy's.

Ballintomb.—The fine black polled herd of Ballintomb, the property of Mr Alexander Mann, was started in 1875. The first bull was "Brux" (947), by Harry 2nd (770), and out of Annie of Westside (2032), purchased from his breeder Mr Walker, Westside of Brux, Aberdeenshire, and commencing with cows selected from Ballindalloch, Westertown, Biallid Corskie, Tullochallum, Rothiemay, and Burnside herds, Mr Mann, with careful buying and judicious breeding, has brought the herd to a highly creditable position. It contains 23 cows, 8 two-year-old heifers, 9 one-year-old heifers, 23 calves, and 2 bulls, and comprises representatives of the Pride, Erica, Coquette, Rose, Fatuna, Duchess, and Baby tribes. Mr Mann has all along guarded against feeding his cows for show purposes, and with close attention the result has been very satisfactory. He entered the showyard first in 1880 with his young stock, and

although he has only been exhibiting on a limited scale, since then he has been a very successful exhibitor. In 1880 Mr Mann purchased from Ballindalloch the fine (Pride) bull "Kaiser" (1253), by Elchies (563), and out of Kindness of Ballindalloch. This bull gave rise to an excellent stock of cattle, and carried the commended ticket at the Highland Society's show at Stirling in 1881. The present stock bull is also of the Pride tribe, and was bred by his owner after St Maurice (1319), and out of Madam Lofters (2231), bought at Rothiemay in 1878. He has distinguished himself in showyards, and imparted very superior progeny. He is well-shaped, having a broad straight back, good shoulders, deep well-sprung rib, and fine general outline. Mr Mann made a happy hit at the Tillyfour sale in 1878 in procuring "Mrs Scott," a pure stamp of a Buchan cow, which will doubtless be the dam of a rare family. She has already produced three capital heifer calves, viz., "Madame Sherrington," "Isabella Fraser," and "Songster." The former is particularly good, but is a trifle small. At the Balquharn dispersion sale last spring, Mr Mann secured "Pride of Aberdeen 27th," by Drayor (1170), out of Pride of Aberdeen 10th (3250), and shortly after she came into his possession she gave birth to a heifer calf after Heir of Paris (1917). Mr Mann also purchased a cow of the Duchess tribe named "Dandelion" (2569) at Lord Huntly's sale at Aboyne. She yielded him a fine heifer calf by Warrior (1291). His last purchase was the Erica cow "Emma" (1733), and her bull calf at foot, from Ballindalloch, which is after the very celebrated bull Justice (1462), and evidently inherits many of his good points. This year Mr Mann sold eleven bull calves at £30 each for exportation to America.

Earnside.—Mr M'Kessack, farmer, Earnside, Alves, has been a careful and successful breeder and rearer of black polled cattle for many years. Thirteen cows, 5 two-year-old heifers, 5 yearling heifers, 2 two-year-old bulls, 1 one-year old bull, and 4 bull calves, constitute the present herd, and these animals bring out largely the good points of the breed, which are indispensable for showyard exhibitions, and which bring animals to the front in local competitions. The success of the herd in the showyards of the past has been very satisfactory to the owner. Mr M'Kessack is a judicious feeder, never endangering the breeding properties of his stock by feeding up for exhibition. Even for animals intended for exhibition, nothing beyond the ordinary diet of turnips and straw is given them until within a few weeks of the show. His heifers are really an excellent lot, and are mostly all in calf to a nice two-year-old bull recently purchased from Mr Duff, Hillockhead. Mr M'Kessack breeds all his pure-bred stock with exception of a few animals, and he has a better bull of his own breeding than the Hillockhead one, his dam

being "Term Day 2nd" (3174). His sire is Don Juan (1555), which is also the sire of all the heifers. "Florence 2nd" (2144), by Cock of the North (1211), and out of Florence (928), has extraordinary milking properties, and is the grand-daughter of a fine cow bought from the late Mr Brown of Westerton. "Fair Maid of Earnside 2nd" (4509) by Scotia (789), and out of Fair Maid of Earnside (3716), which won many prizes in local shows. She is a cow of fair merit. "Maid of Moray 4th" (4510), by General (1297), and out of Maid of Moray 3rd (3711), is a shapely cow of good character, and was very successful in showyards as a heifer. One of the best cows in the herd is "Queen Mary of Mulben" (1043), after the Mayflower tribe, by Jupiter (471), out of Ann of Mulben (1039). Mr M'Kessack bought her, when two years old, from Mr Paterson, Mulben, at 50 guineas. This was supposed to be an extraordinary price then. The value of this cow lies in her breeding. She gave birth to twin calves four consecutive years. Another famous milk cow is "Julia of Earnside 1st" (2116). "Barbara of Earnside" is a descendant of the Easter Skene stock, her dam Barbara 2nd (989) having been bought from Mr Combie, Easter Skene. This year Mr M'Kessack sold three black polled cows for £150 for exportation to America.

Shorthorn Cattle.

Gordon Castle.—Established in 1842 by the purchase of three cows and a bull in Northumberland, "Young Bess," "Bet," "Sally," and "Monsieur Vestris," this large and useful herd has for many years enjoyed a wide reputation as the fountain of pure "shorthorn" blood. Under careful and judicious management, the herd has long been famous for its representation at both local and national exhibitions. Mr Dawson, the present manager, is watchful and successful in breeding, and, with all the advantages derivable from a liberal owner, like His Grace the Duke of Richmond and Gordon, he has very creditably sustained, if indeed not raised, the character of the stock. The bull "Monsieur Vestris" and "Young Bess" were bred by Mr Jobson of Turvielaws, after the second Duke of Northumberland, bred by Mr Bates. The other two of these cows, which laid the foundation of this herd, were bred by Mr Aitkinson of Ewart, from whom they were purchased. His Grace's family of Wimples, Blossoms, Flirts, and Jilts, which, together with Destiny, Queens, and Mysteries, may be regarded as one race, the founder of which was "The Queen," and was extracted from the Ury herd in 1847, are very superior. A grand-daughter of "The Queen" and the first of the Flirts added 14 calves in fifteen years, and was herself disposed of, fat in her eighteenth

year. By a purchase at Mr Boswell's herd of shorthorns at Kingcausie in 1852, the Lustre family was brought to Gordon Castle, where its members proved the Lustres to be sound, regular breeders, strong, well-fleshed animals. The first of the Rosewoods, one of the best and oldest tribes in the herd, was a cow, "Rosewood," purchased at the Eden sale in 1854, when two years old. The Rosewoods were all notable breeders, and the first cow produced 10 fine heifer calves in ten years. They were also famous for depth of rib, wealth of flesh, and superior milking properties. The matron of this tribe, "Rosa," won a second prize at Kelso in 1863 as a yearling, first as a cow at Inverness in 1865, and was sold at 74 guineas. One of the most valuable additions was made to the herd in 1875, in "Queen Esther," purchased for 71 guineas at Mr Bowman's sale at Sandwith, Cumberland. She was almost pure Booth blood, being after Squire Booth, bred by Mr Mitchell of Cleasby. "Lustre," after the Booth bull Royal Hope, bred by Mr Pawlett, was the dam of Chief Lustre, a well-known heifer after Chief Officer, which gained many valuable prizes. The sires used in the herd have been of the famous Matalini and Fame tribes, including "Royal Hope;" and were these "Chief Officer," after Borough Member, "White Duke," "Baron Colling" and "King Butterfly!" These have all done valuable service in the herd. The present stock bull is "Good Hope," after Peter the Great, out of Fairy Queen, and bred by Lord Polwarth. He won the first prize in his class at Banff, Turriff, and the Highland Society's show at Stirling, in 1881. The principal prize takers at the shows of 1882 were—"Good Hope," "Queen Esther" (a broadly built cow of excellent shorthorn character), "Peach Blossom 10th," after Chief Officer and out of Peach Blossom 6th, and "Peach Blossom 14th," a tidy red two-year-old heifer, and a yearling heifer "Chief Lustre 1st." His Grace has not been showing quite so extensively this year as he had formerly been. As an indication of the high character and superiority of the Gordon Castle stock, I may mention that in 1877 it won no fewer than thirty-eight first prizes, ten seconds, five silver medals, and two silver cups; and in 1878 forty-two first prizes, twenty second prizes, four silver challenge cups, eight silver medals, and thirteen special money prizes. In the same year "Chief Lustre" was exhibited at Kilburn, and won the second premium.

A word as to the home of the herd may be of interest. The home farm of His Grace the Duke of Richmond and Gordon at Gordon Castle, Fochabers, extends in all to about 1000 acres. Within the walls there are about 805 acres, excluding 500 acres of deer park, and outside there are some 45 acres of arable land and about 150 acres of riverside pasture. Only about 450 acres are wrought under a regular rotation, the five-course system

being pursued. About 405 acres of beautifully level grounds lie around the castle, and are studded over with magnificent trees. Of these about 200 acres next to the castle are run over with the mowing machine early in the autumn. On the arable land turnips are grown, with from 16 to 20 large cart-loads of well-rotted farm-yard manure and 4 cwt. of bone dust, mixed with 3 cwt. dissolved bones or turnip manure. The cultivated land is mostly light on a gravelly subsoil. In addition to the pure bred shorthorn herd, about 20 dairy cows are kept. A large flock of Leicester breeding ewes is also kept. The stock tups are carefully selected from the very best sources, and for a number of years His Grace has been a very successful exhibitor of sheep as well as cattle. There are also a flock of Cheviot sheep on the farm. His Grace is a generous and considerate landlord, and during the recent depression he was amongst the first to grant concessions.

Stoneytown.—The shorthorn herd at Stoneytown, Boharm, belonging to Mr M'William, was founded some eleven years ago, and contains about 20 animals, all well bred. The first purchase was a distinguished Gordon Castle cow, "Dido 3rd," after Duke of Bowland (21568), and descended through her dam from one of the first shorthorn cows that came to Gordon Castle from Mr Jobson's herd in Northumberland in 1842. Among the other female animals which have been added from time to time, were "Goldie 17th," purchased in 1875, at 61 guineas, from Uppermill, after the celebrated bull Heir of Englishman (24122); "Maud," from Sunbank, by Baron Outhwaite (36197); and "Merry Maiden," from Alnwick Park, by Mr Forr's Fitz-Roland (33936), which left an exceedingly fine stock at Alnwick and Chillingham. From these four cows all the animals constituting the present herd have descended. The bulls used have been "Alfred" (32935), from Petty; "Spicer" (35655), by Mr Booth's K.C.B. (26495), from Clinterty; "Knickerbocker" (38510), from Dalkeith Park; "Favourite" (41528), from Burnside; and "Sir William" (44061), by Mr Booth's Sir Raymond (40716) from Alnwick Park. All these bulls have been prize winners at local shows, and two of them, "Knickerbocker" and "Favourite" have taken first honours at Highland Society's shows. The present stock bull is "Sir Thomas," roan, bred at Alnwick Park, and after Sir Raymond. He is a stylish, evenly-fleshed young bull, with fine full rib, and superior quality. He has been very successful in large competitions, including the Glasgow Highland show this year, and we have no doubt but he will yet come more prominently into notice. The original purchase, "Dido 3rd," is still in the herd, and, although she is fifteen years old, and has reared her fourteenth calf, which was an excellent roan bull by Sir William, she looks quite fresh and healthy. She

excels both as a breeder and milker. A very nice low-standing cow is "Dido 4th," out of Dido 3rd, which has carried prizes at various local shows. "Dido 5th" and "Dido 6th" came from the same dam, the former being after Knickerbocker and the latter by Favourite. They are a pair of very useful breeding cows. "Goldie 17th" was bred by Mr Marr, Uppermill, from whom she was purchased at 61 guineas. She is a cow of fine quality, and is an excellent breeder. One of her descendants is "Golden Rose," by Knickerbocker, a thick handsome cow, inheriting many of the fine points of her famous sire. Another of the same tribe is "Golden Wreath," by Favourite, a white two-year-old heifer of very promising style and quality. She was first at Aberlour, second at Keith, and commended at Elgin Cattle shows in 1881. "Eliza," a very nice roan cow of the Coulardbank blood, after Garioch Lad (17938), is a specimen of good character. In 1881 the calves were nearly all bulls, and were disposed of mostly by private bargain at handsome figures.

Braelossie.—The Braelossie herd of shorthorn cattle, the property of Mr Alexander Lawson, factor for Lord Fife, was founded in 1840, by the purchase of a yearling heifer, "Eliza," sired by Billy (3151), and out of Princess by Sovereign (5285), and bred by Mr Hutcheson, Monyruy, Peterhead. The principal addition to the herd in its infancy, whose stock still remain, was "Shempston Lass," bred by Mr Sutherland, Shempston, from stock bought from the late Captain Barclay of Ury. She proved a very valuable acquisition, and in the course of eleven years she produced eleven excellent calves, eight of which were males and three females. From time to time several cows were subsequently added to the herd, but they fell behind the home-bred stock in breeding, and Mr Lawson disposed of them, and retained his own females, and by changing his stock bull was able to raise a much stronger and finer race of cattle. The bulls used in the herd since the beginning were —"Duke of Gordon" (9043), bred by Mr Cruickshank, Sittyton, Aberdeenshire; "Duke of Leinster" (10155), bred by Mr Todd, Elphinstown; "Sir George Brown" (40705), bred by Mr Bruce, Broadland; "Lord Raglan" (29199), bred by Mr Geddes, Orbliston; "Glenlyon" (26262), bred by Mr Longmore, Rettie; "Vampire" (30201), bred by Mr Cruickshank, Sittyton; "Baron Braco" (30425), bred by the Duke of Richmond and Gordon; "Waverley" (35955), bred by the Duke of Buccleuch; and the present stock bulls "Loftcha" (45052), bred by Mr W. S. Marr, Uppermill; and "Gambetta" (40986), a yearling bull after Arthur Benedict, and out of Flirt 14th, bred by the Duke of Richmond and Gordon. All of these bulls, excepting the latter, did good service in the herd, and had been more or less successful

in local showyards. Matched with cows of excellent character, they give rise to a very superior stock, which gained considerable distinction in different parts of the country. "Baron Braco" was the sire of Lord Bothwell, which won several champion cups. The herd at present consists of 26 cows, 1 aged bull, 3 yearling bulls, 2 two-year-old heifers, 11 one-year-old heifers, and 21 calves, thus making a total of 64 animals. "Loftcha," the aged bull, is the sire of most of the heifers and calves. Excepting this bull, all the herd are the descendants of "Eliza," "Shempston Lass," and "Myrtle 27th." "Myrtle 27th" is after Ben Voilo (28017), and out of Myrtle 20th, and is still in the herd. There is still a good remnant of the Waverley stock in the herd. Mr Lawson is an exceedingly careful breeder, and is very much opposed to overfeeding for exhibition. He generally disposes of his bulls at public sales, and purchasers who are acquainted with the excellence of his stock never fail to make a good offer.

Sunbank.—Of the Sunbank shorthorns not so much is heard as of some others. It is not a large herd, nor is anything done in it specially to draw notice to its merits in showyards. It has been in existence for fully twenty years, and has been carefully and successfully managed. To found it, "Dowager Countess" was bought from Coulardbank in 1861. She was an eight-year-old cow at that time, and had sprung from the finest family in Mr Stephen's fine old herd at Coulardbank. It was the oldest family in Morayshire, if not in the north of Scotland. Mr Stephen was the first man who took over the Spey a shorthorn that founded a family. He believed that Mr Mellis, Spynie, bought a heifer before him, but nothing was heard of it afterwards. Mr Stephen's "Countess," which he brought from England about 1836, was the first of the tribe that proved of so much value at Coulardbank, Inchbroom, Sunbank, and many other places. They were descended from "Carnation" by Apollo, and from cows by Merlin (429), Alfred (23), Butterfly (104), and Suwarrow (636). "Dowager Countess," bought by the late Mr Ray to found the Sunbank herd, produced a calf the first month she was in Mr Ray's possession, but slipped next year and went to the butcher. Her calf of 1861, however, "Countess" became a handsome cow, after a son Picotee (15063), red in colour and good in figure. Round her there soon arose offspring that made a considerable herd,—"Verbina" in 1863, when her dam was only two-years-old; "Rosebud" in 1864; "Flora" in 1865; "Pope" in 1866; "Wilhelmina" in 1867; "Sultan" in 1868; "Sarah" in 1869; "Nancy" in 1870; "Red Knight" in 1871, which was sold at £35, 14s. From this cow and her descendants every animal in the herd came, for the first seventeen years of its existence. The first female that

came into it was "Duchess 10th," from Gordon Castle, which did not remain long in it. Mr Ray had the advantage of the Inchbroom bulls until the herd there was dispersed. After that he had "Baron Outhwaite" (36197), bred at Newton of Struthers after Baron Killerby, and descended on the maternal side from the Myrtles that came from Fashion by Emperor, and cows by Cleveland (145), and Butterfly (104). The next stock bull was "Robin" (43908), son of Baron Outhwaite, and out of a Gordon Castle Duchess by Baron Colling (25560). The present stock at Sunbank is full of the Gordon Castle blood, and contains a number of very superior cattle.*

Garbity.—The Garbity herd of shorthorns, the property of Mr James Watt, was founded in 1864, by the purchase of a cow "Tidy" at the Huntly Lodge sale. She was bred in England, and was well advanced in years before Mr Watt obtained her. The first addition was "Marchioness," purchased at the Inchbroom dispersion sale, where she brought the highest price of the cows, having won the second prize at the Highland Society's show at Inverness when a two-year-old heifer. Mr Watt has still some of her stock in the herd. To begin with, Mr Watt got the service of the Gordon Castle bulls, which infused a deal of excellent Booth blood into the very foundation of his herd. He bought a cow and heifer from Mr Meade Waldo of Stonewell Park, Kent, about five years ago, along with a couple of bulls. He has these still in his herd, and all of them have done fairly well. The bulls are still the stock bulls of the herd, and the two females have been breeding regularly. Strange to say, their calves have all been males excepting a female this year. One of the bulls is a "Flower" bull, and the other of the "Waterloo" tribe. A cow which Mr Watt obtained four years ago from Mr Fisher, Pitlochry, proved a very valuable animal, having fostered many fine calves. She was sired by the famous Royal Benedict, and is out of an Anette cow, and has had three or four bull calves in succession. At present the herd comprises 15 cows, 6 two-year-old heifers, 15 calves (four of which are bulls), and 2 bulls, or about 40 in all. Among the heifers is "Dorothy," after Fitz-Harry and out of Molly, an Inchbroom cow. Through her sire she has Booth blood in her veins, and is a very perfect animal. She won the first prize as a yearling at the Highland Society's show at Stirling, and at Elgin last year (1881), and as a two-year-old at Elgin this year. Another fine heifer is "Wild Rose," after Captain Cook, bred by Mr Gumbleton of Glanatora, Co. Cork, Ireland, is also in Mr Watt's possession. She was first at the Royal Dublin Society's show, and first at Glasgow, Elgin, and Inverness this year (1882).

* Owing to the death of the owner, this herd has been dispersed since the above was written.

"Selina," a yearling heifer after Fascinator, out a Selina cow, and bred by Mr George Cater, Londonderry, is a fair heifer. Mr Watt has hitherto disposed of his bull calves at public sales, and his average prices invariably stood very high. He has been devoting more attention to the breeding than to the feeding of stock, but though he has never exhibited on a large scale, his cattle have won a great many valuable prizes. At the Highland Society's show at Aberdeen Mr Watt won a second prize for a bull, at Kelso a second for a heifer, and the same heifer won second at Stirling, where Mr Watt also won the first and fourth tickets with other animals. He has gained a great many prizes at local shows for his older stock. For bull calves he won a second and third prize this year at Perth, and a first prize in 1881.

Swine, Poultry, and Markets.

Swine.—The rearing of swine in both counties receives comparatively little attention from the farmers. There are usually one, two, or three pigs on every farm, and in many cases they are reared in courts among young cattle. Breeding sows are kept on some holdings, as well as by millers and distillers, and the young pigs are usually taken away when about five weeks old. Then they are generally worth from 11s. to 16s. each. The breeding and feeding of swine undoubtedly deserve much more attention than they receive. Breeding sows, as a rule pay their owners very well. In order to show the number of swine at different periods since 1857, we subjoin the following table :—

Year.	*Moray.*	*Nairn.*
1857, . . .	4325 pigs.	1420 pigs.
1870, . . .	3461 „	733 „
1876, . . .	3449 „	932 „
1881, . . .	2864 „	715 „
Decrease since 1857, .	1461 „	705 „

These figures bring the fact clearly out that there is an extraordinary falling off in the number of swine within the past twenty-five years. In Morayshire, it will be observed, there is 1461 of a decrease, while in Nairnshire there are not much more than half the total number of 1857.

Poultry.—There are a great many famous poultry breeders in Moray and Nairn. Farm-yards are usually well stocked with fowls, and a considerable revenue is derived from them. Poultry reared at various places in both counties have oftener than once taken prominent positions in the prize lists of large poultry shows.

Markets.—Like other northern counties, these two are well provided with markets and auction marts. Elgin, Forres, Gran-

town, and Nairn are the chief seats of cattle markets. Grantown market is the principal one for sheep for Morayshire, and also for the upper reaches of the counties of Inverness, Banff, and Nairn. Some of the better class of farmers in the lower parts of Morayshire, as well as regular dealers, kill cattle and send them to London as dead meat. They generally find this the most profitable way of disposing of beef. The cost of transmitting dead meat is considerably lower than that of live stock.

Labour.

There is a lack of ordinary farm servants in these counties, but, as we have already noticed, in some districts there is a great difficulty experienced in getting a sufficient supply of labourers.

During potato planting and lifting, hoeing, and harvesting, farms in the vicinity of towns or villages have little difficulty in getting day labourers; but in some of the more inland districts casual workmen are not so plentiful as could be desired. There is still a deficiency of servants' cottages, although much has been done in the erection of them within the past twenty-five years. It is a very essential matter indeed to have good accommodation for married men. It is very probable that great and needful improvements will be effected in providing servants' cottages in these counties before many years have come and gone. Tenants fully realise the value and need of them. A well-known farmer in the "Laigh of Moray," in referring to the scarcity of cottages, remarks—"Advertisements too frequently appear in newspapers wanting first-class horsemen, married, without encumbrances." Generally speaking, single men are most plentiful, and the majority of these sit, eat, and sleep in "bothies." Several of them board in the farm kitchen, and with married fellow-workmen. Married men have been getting more numerous within the past few years. The rate of wages in 1855 was about an average of 70 per cent. less than in 1878; but since then, on account of the agricultural depression, the cost of labour has fallen at least 15 per cent. On a farm in the neighbourhood of Elgin the tenant paid the following half-yearly wages in 1855 and 1881:—

	1855.	1881.
Grieve, . . .	£9 0 0	£16 0 0
Foreman, . . .	7 10 0	14 0 0
Secondman, . . .	5 0 0	12 0 0
Thirdman, . . .	...	11 10 0
Cattleman, . . .	...	12 10 0
Out-girl, . . .	2 5 0	6 5 0

First ploughmen generally get from £24 to £28; second ditto, from £20 to £44; and third ditto, about £20, with an allowance

in each case of about 6 bolls of meal (140 lbs. per boll), 24 cwt. of coals, and 1 ton of potatoes per annum, and a quart of milk daily. Grieves get from £30 to £40, and more if any extra responsibility devolve upon them; but average wages would be about £32, with the same allowance or perquisites as the horsemen. In many cases the wages in 1880 were double those of 1855. Married men in cottages have also a garden in most cases. In every case single men do not get potatoes in "bothies," but the principal meals are oatmeal porridge, oatmeal brose, and cakes. They usually sell a good deal of the meal allowed them, which is invariably more than they can consume, and purchase other commodities, such as tea, coffee, butter, bread, and fish, &c. Harvest hands, like ordinary farm servants, are paid according to their undertakings and capabilities. Including all, the wages of married men would range from £46 to £49 in the year. The ploughmen are, as a rule, an industrious, trustworthy class of people, and usually take a great interest in furthering everything that tends to benefit their masters. Women for kitchen work get from £6, 10s. to £8, 10s., and outdoor girls get from £4, 10s. to £6, 10s. There are very few women engaged for outwork now, because it is found more advantageous to engage young men. Taking all in all, it cannot be said that wages are at present too high.

Sheep Farming.

In the lowlands of these counties sheep farming does not constitute an important industry, although there are many large flocks of cross and half-bred lambs fattened during the winter season. An occasional breeding flock is to be seen where there is a run of links or waste land attached to the arable holding. Twenty-five years ago, perhaps, the breeding of sheep received more attention, but now the breeding and feeding of cattle have superseded it to a certain extent. Farmers find it most lucrative to buy in lambs at the weaning season, when, after a good lambing season, they are to be got in all parts of the country. If grass is found to be plentiful, the lambs are bought in as early after weaning as possible, and kept in parks during the fall, by the end of which there is almost invariably a patch of turnips laid off for them. In addition to turnips, feeding flocks get hay or straw daily, which is supplied in hurdles on the field. Where there are commodious open courts, flocks are sometimes fed in them with cut turnips, straw, or hay, and when well advanced in fattening, they receive a little cake or corn. The ordinary allowance of cake and corn, besides a liberal supply of turnips and fodder, is from ½ lb. to 2 lbs. per sheep per day. It is not lambs only that are fed. Large numbers of wethers and eild

ewes—generally cast ewes—are also fattened. The same system of feeding is adopted for these as for lambs.

Too many disastrous years have occurred since 1857. The losses sustained at various periods were irreparable and disheartening. This has been more severely felt in the higher lying districts, where the climatic influences during winter are disastrous to both animal and vegetable life, and where the many untoward seasons, which have passed within a comparatively short period, have left an impression and gloom on the mind of the flockmaster that will not be easily suppressed. The rate of mortality among flocks, and more particularly lambs, between 1870 and 1881, was remarkably high. It is so far gratifying, however, to have to note that the winter of 1881–82, which was quite exceptional in its character, has helped greatly to revive the spirits of sheep farmers. Lambs are more numerous, and much stronger and healthier this year (1882), than they have been for years, while the prices for all kinds of sheep are remunerative. The death-rate has been comparatively insignificant. Since the beginning of the present summer the weather has been favourable to vegetation, and hill pasture, as well as that on cultivated land, has been most luxurious.

At various periods during the present century handsome profits have been realised from sheep farming. It was a lucrative industry twenty or thirty years ago, but in recent years the price of wool, the cost of wintering, and other circumstances, as well as the seasons, have affected it considerably. The price of mutton has advanced greatly, but the gain on this point has been more than counterbalanced by the increase in the cost of maintenance—rise in rent, in the cost of living, and in the cost of labour—coupled with the decline in the price of wool. Then the average death-rate has lately been higher than formerly, and on the whole the position of sheep farmers has undergone a marked change for the worse within the past ten or twelve years.

The system of management pursued by sheep farmers in these counties can hardly be said to differ in any respect from that which prevails generally over the north of Scotland. In the colder districts smearing is preferred to dipping. As the following statement will show, the former plan is, as a rule, more profitable than the latter. Sheep not smeared require two dippings in a year, and these cost 30s. per 100 head—14s. for the material, and 16s. for the dipping operation—being 2s. per day to four men on each occasion. Smearing has to be done only once a year. It costs 10d. a head, or say 85s. for 100 head. Then the yield of wool from dipped sheep (blackfaced) would average about 3 lbs. per head, or 300 lbs. from 100 head; whereas from smeared sheep the weight of wool would be

exactly double. In 1881 dipped or white wool fetched 6d. the pound, and smeared wool 5d. per pound. The advantage in favour of smearing is thus seen to be of some importance:—

Smearing 100 sheep once costs	£4 5 0
Dipping twice, ...	1 10 0
Extra cost of smearing, .	£2 5 0
Value of wool from 100 smeared sheep, . .	£12 10 0
Do. do. dipped do., . .	7 10 0
Extra value of smeared wool,	£5 0 0
Net gain in smearing per 100 sheep, . . .	£2 15 0

It has in addition to be noted, that smearing is a much surer preventative against vermin and contagious diseases. The cost of wintering sheep when sent from home is about 5s. 6d per head. Hoggs sell best in the month of April, and cast ewes and wethers in September and October.

In Morayshire, in 1857, there were 56,336 sheep, of which 25,315 were for breeding purposes, 12,947 of all ages feeding, and 18,074 lambs. In 1868 there were 49,848 one year old and above, and 27,899 under one year old, which makes a total of 77,747. In 1881 there were 32,557 one year old and above, and 16,030 under one year, making a total of 48,587. It will thus be seen that there is the enormous falling off in the total number of sheep in Morayshire of 7749 since 1857. This substantiates what has just been stated.

In Nairnshire there were 16,875 breeding sheep, 7896 of all ages feeding, and 11,214 lambs in 1857, which makes a grand total of 35,985. In 1868 there were 17,160 sheep one year old and above, 7156 under one year old, and a total of 24,316. In 1881 there were 12,002 one year old and above, 3978 under one year old, and a total number of 15,980. The difference between the total of 1857 and 1881 in this county is even greater than in Morayshire, but there was a very notable decrease in the end of 1880 and first of 1881. The total number in 1880 was 20,108. It must be understood that though there is a very noticeable decline in the numbers thus set forth, sheep farming in the upper districts is carried on with greater interest than it was twenty-five years ago, and that the falling off is principally caused by reducing flocks in the lower districts. The great reduction in the numbers of young stock is directly the fruits of untoward seasons.

Industries—not Agricultural.

We have taken up so much space with the agriculture of these counties, that we must limit our remarks on other industries.

The chief of these are the herring and white fishing along the Moray Firth. Beginning at Garmouth, the most eastern village in Morayshire, we find that no fishings are now carried on; but Mr James Duncan established a boat-building institution last year, and during the short period of its existence ten or twelve boats of the carrel-zulu shape have been built.

At Lossiemouth about 120 boats are in use every season, each boat having at least two men aboard. The average value of each of these boats is about £250. For the last twenty years there has been a falling off in the quantity of fish caught. During that period the annual catch averaged about 100 crans per boat. From 1858 to 1863 the catch averaged about 200 crans, being a very successful fishing period. The value of the fish, generally speaking, has been about £1 per cran for the past twenty-five years. Some fishermen prefer taking a bounty of from £20 to £40 for the season, instead of their chances by the cran. The majority of fishermen, however, are paid by the cran. In a good fishing season this is undoubtedly the most profitable way of engagement. The proper season for the herring fishing commences about the 10th of July, and lasts till about the 10th of September. Sometimes the fishermen go 40 or 50 miles on fishing expeditions, while fish are at other times to be found within two or three miles of the shore.

The white fishing is prosecuted nearly the whole season. About fifty boats, manned by about seven fishermen each, pursue this fishing, and the average return is as nearly as possible 6 cwt. per boat. White fish are usually worth about 12s. per cwt., thus making the draught of each boat worth about £3, 12s. Lobster fishing, to a small extent, is carried on by a few men. The fish are generally sent to English markets. The portions of the sea nearest to the combined villages of Lossiemouth, Branderburgh, and Stotfield are very good for their yieldings of lobsters; and about half a century ago people came from North Sunderland and Berwick-on-Tweed to prosecute the lobster fishing, and were very successful. The harbour of Lossiemouth was founded in 1835 by Colonel Brander, Pitgaveny. The principal importation is wood from America and the Baltic, and coals from different parts of the country. There is no exportation of any moment, excepting that potatoes and some grain are occasionally shipped for England.

At Hopeman there are 33 boats employed at haddock fishing, and the fish are generally sold to the curers when caught. The number of boats engaged in the prosecution of the haddock fishing some twenty years ago was not more than half the present number, but the total catch was considerably higher. About 70 herring boats belong to Hopeman, but very few of them are employed at this station. Fishermen find it more

profitable to go fishing at other parts of the coast. The harbour at Hopeman is by far too small to facilitate the development of the fishing resources, it having been built some forty years ago, when boats were fewer in number. A good deal of money has recently been expended from time to time on repairs.

Burghead is an important fishing station, and has been for a great number of years. In 1857 there were 93 boats engaged, and the number of men employed was about 600; while in 1882 there were only 36 boats and 260 men engaged. This implies a material falling off in the catch, which in 1857 was 93 crans, and in 1882, 53½ crans. The harbour was constructed about 1807, and since then has undergone frequent repairs. At present it is being remodelled and very much enlarged, and in the course of a year or so it will be one of the safest harbours along the Moray Firth. White fishing is also carried on here to a small extent. Fourteen large and small boats are engaged by about 130 men, and the average catch is about 400 tons in the year. In this village about twenty or thirty men are employed in the Morayshire Chemical and Manure Works, the property of Mr William Adam.

There is an extensive fishery trade carried on at Nairn and Campbeltown, and has been for many years. The most important fish caught is herring. White fish consist of haddocks and codfish. The burgh of Nairn charges the fishermen 4s. as stance dues for their boats, and a compromise of 20s. per yawl engaged in white fishing. The fishing boats belonging to Nairn and Campbeltown at 10th October 1882 were—

	1st Class (Herring) Boats.	3rd Class Boats (White Fishing).	Total.
Nairn.	41	39	80
Campbeltown, . . .	12	12	24
	53	51	104

The number of men engaged, besides a crew of five men for two boats—a large and small one—were 205 in Nairn and 60 in Campbeltown. Each man has three assistants for gathering bait, putting it on to hooks, curing, hawking, and going to the market with fish; and there are also 615 women, boys, and girls employed in Nairn and 180 in Campbeltown, which, added to the number of men engaged, make a total of 1060.

Average Value of Herring Boats and Nets.

Nairn, 41 boats, at £200 each, ...	£8200
Do. 39 yawls, at £30 each, ...	1170
Campbeltown, 12 boats, at £200 each, . . .	2400
Do. 12 yawls, at £30 each, . . .	360
Total value, . . .	£12,130

TOWN SEWAGE, AND ITS APPLICATION TO AGRICULTURE.

By David Robie, Bedford.

[*Premium—Ten Sovereigns.*]

With the increase of urban populations, and the introduction of additional water, came the urgency for the discharge of that water, and its accompanying refuse matters, in compliance with the requirements of sanitary law. Pecuniary considerations had to give way, for the health of man was the primary consideration; and the application of that sewage to manure the land was a secondary, but still an important matter. A select committee of the House of Commons investigated the subject in 1862, and sewage irrigation was much discussed before and since that time in agricultural newspapers and other publications. Extreme opinions were expressed as to its agricultural value, for some said it was worth 20s. per head per annum, and fanciful notions were imbibed as to its produce on irrigated farms. Professor Anderson, in a lecture delivered under the auspices of the Highland and Agricultural Society of Scotland in 1864, estimated the refuse of each head of the population at 6s. per annum. Sir J. B. Lawes of Rothamsted states, that when the human excrements are deprived of water, they amount to about 46 lbs. per head per annum. But when it is considered that about 30 tons of water is supplied annually to each urban resident, we realise in a great measure the enormous quantity of water with which the human excreta is charged. Dr Voelcker, in treating on the value of sewage, states that there were about seven grains of ammonia in the gallon, which is the most valuable constituent, and the amount of the other manurial substances—mostly phosphoric acid and potash—rise and fall with it. It is hardly necessary to explain that sewage differs widely in character, according to the amount of water with which it is charged.

There are now said to be about one hundred towns which have dealt with their sewage, and those have been most successful who have sent it directly to land. Wasteful chemical processes, settling and precipitating tanks, filter beds, &c., have been brought more or less into use, but generally with indifferent success, and at a great cost. Some of these plans have been abandoned, and recourse had to irrigation, which is really the most economical way of disposing of sewage in an innocuous manner. The costs, however, have been very heavy, and taking into account the initiatory outlay, and the rents, rates, and labour, it is obvious that sewage farms do not pay. It is indeed argued, that the expense of scavenging is saved by the system of

carrying away the sewage by water, and the cost of removing the excrement and other solid matter before the new system was introduced, amounted to a considerable sum per annum. The examples of sewage farms, which we give in the following pages, will best show the financial position of this comparatively new enterprise in the country.

Grass farms pay sewage irrigation in not a few cases, and the Edinburgh meadows have been often quoted as an instance of success. It is probably from this example, which has been long before the public, that extravagant opinions of the value of sewage have arisen. Before noticing two instances of profitable grass irrigation by sewage, it may not be considered out of place to refer to the "dry earth system" of dealing with the voidances of towns and households. It was brought before the public a number of years ago by the late respected Rector of Fordington, and its merits have been fairly and fully tested. The principle is as old as the wilderness journey of the ancient Jews, and it is practised still in several Mahommedan countries. It also claims to fulfil all the sanitary, commercial, and agricultural requirements. It is also claimed for it by the late Rev. Mr Moule, that it can be applied to three-fourths of the people of the United Kingdom, at one-third of the cost of the liquid system. The public have practically only accepted these views to a very limited extent, for, unless in isolated households and large institutions, the plan has not been adopted. It has been estimated that one ton of dry earth would suffice for each individual for a year, and it is applied and used in closets, very much in the same way as the water, but the mere delivery and removal of the required earth in a town would be a formidable undertaking. In villages, hamlets, and private dwellings no such difficulty exists.

The Logie Sewage Meadow.

In perusing the capital agricultural report of Forfarshire which was drawn up for the Board of Agriculture, and published in 1813, we found a brief report of sewage irrigation, of which the following is an abstract:—"Colonel Kinloch has long practised watering on his estate of Logie, in the lower part of Kirriemuir parish. He uses the water of a rivulet which rises in the marl loch of Kinnordy, and receives much filth from the town of Kirriemuir, and from plash mills in its progress. The land is laid up into broad and high ridges, and the water is conducted in a main drain along the highest side of the field. It is let out of the main and passes down ruts along the summit of each ridge, from which it trickles down the sides into the furrows. The sewage is let on in November, and is continued till the middle of April. The Colonel has now three enclosures

under the watering system containing over 35 acres, and they are let to graziers for pasture during the summer. The field which was first subjected to water about the year 1770, now lets for £8 an acre, and the other fields let from £5 to £7 per acre, according to the time the water has operated in improving the herbage."

Milliken Estate.

The only other example of the application of sewage to grass to which we shall advert is at Milliken, in Renfrewshire. The water of a brook, as it leaves the adjacent village of Kilbarchan, is conducted along the highest side of a 15 acre field, from which it trickles over the sloping surface. It is flooded for about four months in the year. The water is generally put on in January, and not withdrawn till May, but the times are regulated according to the weather and the state of the grass. When the weather is dry and the water scarce, the ground is irrigated in patches two weeks at a time, and damage from frost has to be guarded against. It is mowed annually, and produces an average of about 3½ tons of hay per acre. The aftermath is either cut or pastured with sheep or cattle. It is permanent grass, which consists of rye-grass, timothy, fescue, and some indigenous kinds. The village contains over 2000 people, but as the drainage of the place has never been systematically executed, the household excrements do not pass into the burn. A larger breadth has been occasionally irrigated, but owing to the defective outfall it is not persevered in. The original cost of the undertaking was about £60, and the annual cost of distributing the water evenly is about 5s. an acre. This enterprise was carried out by Mr Glegg, the resident agent, and it pays three times better than the adjacent tillage land. We are not told the cost of introducing the water at Logie, but both that and the Milliken undertaking are good and profitable investments. Other places could be named where the system is confined to grass, and on ground not by any means the best, where sewage irrigation has been a great success.

We now propose giving the descriptive particulars of three sewage farms, which are conducted on a system of mixed husbandry, much the same as on an ordinary farm. It happens that we inspected all the three in 1875, and again we looked minutely over them last year (1882). We also mean to give some account of the disposal of the sewage at Aylesbury, by the A. B. C. process,—a plan which has received a good deal of attention in past years. The first we shall refer to is—

The Bedford Farm.

This is the only farm of the four which stood in the competing list for the prizes offered by the Royal Agricultural

Society of England. It came in first among the farms which were utilising the sewage of not more than 20,000 people. This was in 1879, and on the whole it is a soil well adapted for the application of sewage. It is sufficiently porous for irrigation, and measures 183 acres, but 30 acres are not sewaged. Additional ground has, however, been obtained lately, and it is all wanted for the quantity of liquid which has to be disposed of. The volume of sewage is estimated at 950,000 gallons per day, which is nearly 4500 tons, from a population of 19,500. It flows out in a covered way to the farm, at the distance of about a mile, where pumping works have been erected, which lift the sewage 13 or 21 feet, according to the altitude of the ground to which it is applied. These are propelled by two capital horizontal steam engines of 12-horse power each.

Assuming that the estimated quantity is pumped daily, it would show that each inhabitant was supplied with more than 40 gallons every day. It is necessary to explain, however, that the storm water is conducted into the town sewers, and that the area of the town exceeds 500 acres. Like most other towns, the local authorities have erred in this point, and thus the sewage is watered down, and deteriorated much. There is the farther fact, that the main sewer, which is adjacent to the river, admits more water in its passage to the pumps. Supposing the pumps are kept in operation during 310 days in the year, it would be equal to a rainfall of 86 inches over the 153 acres under irrigation, were it equally distributed. As the land under the corn crops is not irrigated, a much larger quantity falls to the other fields. When the annual rainfall on the farm itself is added, which amounts in the bygone years to 25 or 26 inches, the aggregate quantity comes to no less than 110 or 112 inches per annum. We thus see the importance of obtaining a large extent of ground for the disposal of sewage, otherwise the land would be so flooded as to destroy any crop that could be tried. It need scarcely be told, that when great rainfalls occur, the sewage cannot be applied to the land.

The cost of the site on which the pumping works were placed, with the necessary buildings, engines, and pumps, was £3756 and the laying out of the farm, carriers, pipes, &c., was £3192, making a total of £6948. Only about 5 acres required under draining, which was done with 2-inch pipes, 60 feet apart and 3 feet deep. This was the sum necessarily expended before irrigation work was commenced, and rents and labour becoming due before much return was obtained from the produce of the farm, the actual loss in two years amounted to £860. Under these untoward circumstances, and at the end of the year 1872, the Local Board resolved to obtain a report of the farm from Mr J. C. Morton, in which he stated that it was possible to make

the farm pay. His recommendations briefly stated, were to follow the arable or mixed system of husbandry—partly as market gardening, and to provide for the partial consuming of the produce on the farm. When this report was received, several members of the corporation proposed letting the farm, and it was retained by the narrow majority of 8 to 7. According to a report on sewage by Mr Rawlinson, C.E., and Mr C. S. Read, M.P., which was presented to both Houses of Parliament in 1876, the loss on the farm is entered at £371, or a penny in the pound on the rateable value. The yearly instalment on the cost of the works is shown to be £552, but this annual charge is not entered in any of the balance sheets issued by the corporation. We now enter the balance sheets of 1874 and 1880, as best showing the financial position of the undertaking.

Crop and Year 1874.

Cr.	Stock in hand and purchased,	£544	8	0
	Sale of crops,	2515	13	10
	Working plant and live and dead stock,	269	9	0
	Sewage works,	24	2	8
	Hay,	48	2	6
	Beans,	59	10	0
		£3461	6	0
Dr.	Stock,	£431	0	0
	Working plant,	224	4	0
	Labour, manager, and engineer,	667	17	2
	Tradesmen's bills,	780	10	9
	Rent,	917	4	0
	Rates and taxes,	113	14	7
	Permanent works,	24	2	8
	Oats,	16	5	0
	Hay and beans,	107	12	6
	Balance 1874,	180	15	4
		£3461	6	0

Balance Sheet—Year ending December 31, 1880.

Dr.	Stock,	£1533	9	4
	Working plant,	532	17	6
	Labour,	724	5	6
	Manager's salary,	126	5	0
	Corn and straw purchased,	26	13	0
	Corn, rye-grass and hay, produce of farm,	280	0	0
	Seeds and plants,	129	11	5
	Permanent works,	46	9	6
	Auctioneer's commission and expenses,	46	8	0
	Live and dead stock purchased,	592	0	7
	Rent,	928	10	0
	Rates, income tax, and land tax,	95	0	4
	Insurance and miscellaneous bills,	120	3	4
	Carry forward,	£5181	13	6

Pumping— Brought forward,	£5181	13	6
Engineer's salary,	78	0	0
General expenses,	62	10	1
Coals,	191	4	8
Balance,	270	0	4
	£5513	8	3

Cr. Stock in hand, December 31, 1880,	£1523	8	0
Working plant and live stock,	566	17	0
Live and dead stock—dairy,	516	6	6
Crops sold by auction,	613	16	9
Crops sold by manager,	1656	2	7
Corn, rye-grass, and hay consumed,	280	0	0
Permanent works, income tax, land tax repaid,	65	11	7
Rent returned by Captain Pothill Turner,	21	6	0
Balance,	270	0	4
	£5513	8	3

The rateable value of the town on which the assessments are laid is £75,361, and the number of houses (which are rapidly increasing) is 4100. Dairying was commenced in March 1880 in a small way, and 19 cows are now generally kept in milk. The yearly amount realised per cow is about £27 or £28, but many of the cows are after the first calving. For the milk 9d. per gallon is obtained in summer, and 10d. in winter. In summer the cows are kept in the house from 5 o'clock A.M. to 5 P.M. They are fed with $1\frac{1}{4}$ to $1\frac{1}{2}$ cwt. of rye grass and from 3 to 6 lbs. of cotton cake per day. At night they have the run of seven acres of old pasture. In winter they are kept entirely in the house, unless in fine weather, when they are turned out for a few hours, and they have about 5 lbs. cotton and linseed cake, pulped mangels, chaff, and a small quantity of brewer's grains. The best milkers have also about half a peck of crushed oats per day. Before the dairy was commenced, buildings had to be provided for cows and pigs, &c., as well as a house for the manager, which cost £1300 in all. Mr John H. Collet manages the farm to the entire satisfaction of the authorities, and it is a work that demands skill, labour, and attention, as may be inferred from the following tabular statement. It comprises the acreage and average price per acre of each crop for the past seven years, as well as the averages of the whole crops of the seven years.

Italian rye-grass and mangels are the two special crops on irrigation farms, in consequence of their capacity for absorbing large quantities of sewage, and on the Bedford farm 50 to 60 acres of these two crops are grown annually. They are crops which must be sold in the neighbourhood, as they would not afford carriage by railway; but the quantity grown was beyond the demands and requirements of the town and neighbourhood,

BEDFORD IRRIGATION FARM.

Statement of Cropping, with Acreage and Average Price per Acre of each Crop for the Years 1875, 1877, 1879, and 1881.

Description of Crop.	1875.			1877.			1879.			1881.			Average per Acre for
	Acreage.	Average per Acre.	Total Produce.	Acreage.	Average per Acre.	Total Produce.	Acreage.	Average per Acre.	Tota Produce	Acreage.	Average per Acre.	Total Produce.	
	A. R. P.	£ s. d.	£ s. d.	A. R. P.	£ s. d.	£ s. d.	A. R. P.	£ s. d.	£ s. d.	A R. P.	£ s. d.	£ s. d.	£ s. d.
Italian rye-grass,	22 0 0	18 2 9	399 0 6	31 0 0	10 6 9¾	320 10 0	20 0 0	8 4 7½	164 12 8	26 1 0	13 0 7½	342 1 6	7 years, 10 17 3½
Permanent pasture,	30 0 0	6 1 0¾	181 10 6	7 2 0	8 0 0	60 0 0	30 0 0	5 10 0	165 0 0	37 3 0	5 11 3½	209 0 0	7 ,, 6 1 7¾
Mangels,	40 2 20	14 15 0½	599 6 6	37 0 0	12 16 11	475 6 0	26 0 0	11 5 3¾	296 18 3	29 0 0	10 11 4½	306 10 0	7 ,, 12 17 8½
Swedes,	...	...	...	2 1 30	12 17 9	31 8 1½	0 3 0	12 4 9	9 3 7	1 3 0	9 12 10¼	16 17 6	5 ,, 12 4 7
Carrots,	7 3 0	15 1 5	116 1 0	7 2 0	17 0 0	127 10 0	6 1 0	15 11 5½	97 6 8	2 2 0	12 16 8	32 1 8	7 ,, 13 17 8¾
Parsnips,	...	...	...	1 0 20	17 15 6	20 0 0	3 1 0	18 0 6½	58 11 9	3 0 0	15 13 0	46 19 0	5 ,, 17 5 4½
Potatoes,	25 1 0	5 11 6½	140 16 6	15 2 0	13 5 2	205 10 0	12 0 0	30 18 3½	370 18 3½	12 0 0	17 10 0	210 0 0	7 ,, 15 7 3¾
Onions,	10 0 20	28 6 10¾	287 0 0	13 3 0	29 3 7½	401 5 0	20 1 0	17 17 7	362 1 2	15 2 0	36 17 6½	571 11 5½	7 ,, 31 4 2¼
Wheat,	16 1 10	14 0 4½	228 13 9	13 0 0	14 11 9¾	189 13 11½	16 0 0	11 1 2	176 19 4	20 1 0	18 6 4½	370 19 0	7 ,, 13 9 4½
Oats,	14 0 0	8 3 11	114 15 0	11 2 0	12 5 0	140 17 6	15 2 0	11 0 3	170 13 9	16 0 0	10 5 0	164 0 0	7 ,, 10 8 6
Beans,	...	...	...	3 2 0	6 0 0	21 0 0	3 0 0	10 0 0	30 0 0	6 0 0	15 14 0	94 4 0	6 ,, 12 12 5
Barley,	...	...	...	...	...	...	4 1 0	10 5 10½	43 15 0	4 2 0	12 0 0	54 0 0	3 ,, 11 3 0¾
Spring cabbage,	6 1 10	13 17 7	87 12 0	3 0 0	14 0 0	42 0 0	4 2 0	18 18 1½	85 1 7	2 2 0	12 0 0	30 0 0	7 ,, 13 0 4¼
Pickling cabbage,	1 1 0	27 18 11	34 18 8	2 0 0	8 12 8¾	17 5 5½	...	...	...	...	...	...	3 ,, 13 8 11¼
Savoys,	...	...	...	2 1 0	16 0 0	36 0 0	5 0 0	13 15 6	68 17 6	2 2 0	6 16 0	17 0 0	6 ,, 12 14 2
Cauliflowers,	6 0 0	1 13 4	10 0 0	1 2 0	21 7 4	32 1 0	6 0 0	3 14 7½	22 7 9	3 2 0	22 13 1	79 5 9	7 ,, 11 6 4½
Kidney beans,	...	...	...	1 0 0	20 0 7½	20 0 7½	0 3 0	20 0 0	15 0 0	...	...	...	4 ,, 19 7 5¼
Lettuce,	...	...	...	...	...	...	0 0 20	21 10 8	2 13 0	...	...	...	1 ,, 21 10 8
Celery,	...	...	...	0 1 0	48 0 0	12 0 0	...	...	...	...	...	...	3 ,, 46 9 8¼
Cucumbers,	1 0 0	16 1 0	16 1 0	1 0 0	22 15 0	22 15 0	...	...	...	...	...	...	4 ,, 18 6 0
Vegetable marrows,	0 0 10	21 0 0	1 6 3	0 1 0	12 0 0	3 0 0	...	...	...	...	...	...	3 ,, 14 17 4
Asparagus,	0 0 20	20 8 0	2 11 0	0 0 20	48 0 0	6 0 0	0 1 20	16 0 0	6 0 0	0 1 20	8 0 0	3 0 0	7 ,, 22 14 10
Rhubarb,	0 0 20	40 0 0	5 0 0	0 0 20	12 0 0	1 10 0	0 0 20	2 10 0	0 6 3	0 0 10	6 1 4	0 7 7	7 ,, 17 18 7
Prickley comfrey,	...	...	...	...	...	...	0 1 0	10 0 0	2 10 0	...	...	...	...
Currant trees, &c.,	...	...	...	0 2 0	6 0 0	3 0 0	2 0 0	...	...	...	...	...	...
Meadow sub-let,	...	...	...	22 2 0	...	119 0 0	...	...	...	...	...	...	...
Roads, carriers, seed beds, &c.,	...	...	...	1 3 0	...	...	6 3 2	...	...	7 1 32	...	...	...
	180 3 30	..	2224 12 8	180 0 10	...	2307 11 10	183 0 22	...	2144 16 6½	190 3 22	...	2547 17 5½	

as will be seen by the unremunerative prices obtained. The rye-grass commanded over £18 an acre, as will be seen, in 1875, but the average of the series of years is under £11. This state of matters was disappointing to the committee in charge of the farm and to the manager, and it led them to start the dairy, which is expected to yield nearly two-fifths of the whole receipts. The average annual loss on the farm is about £270, and the cost of pumping is rather in excess of that amount, so it is plain that the farm would have paid its way if the sewage could have been delivered by gravitation. The high rent charged, namely, £5, 1s. per acre, is complained of, but the additions which have now been obtained, will reduce the average slightly. Considerably more than one-third of the land was hired at double its value as ordinary farming land.

About 25 acres of the farm are employed for growing market gardening crops, but it is a mistake to suppose that that description of crops is specially adapted for sewage farms. Even on the large Croyden farm, which consists of a light soil, near the metropolis, only one acre in ten is cultivated with vegetables. At Bedford there is always a considerable breadth of onions grown, and, as will be noticed, they command an average of £31, 4s. per acre, which with one unimportant exception is more than any other crop. Parsnips have been introduced for some years, and they sell at a good round price. Of all crops, Italian rye-grass is noted for its ample produce, and its rapid and early and late growth; in consequence of which it takes great floodings of sewage after each cutting—generally four mowings in the season, and it is generally down for two years.

It will be observed from the table of cropping, that the prices of the particular crops have been pretty uniform throughout the whole series of years, and that the aggregate amount of money obtained each year varies little. In 1881 the proceeds of the crops were £2547, which is £403 more than was realised in 1879, which was a year of disaster in all descriptions of farming. As in the balance sheets of most other sewage farms, there is no annual instalment charged for the large original investment in laying out the farm, or for farm buildings.

Banbury Sewage Farm.

This ancient borough and market town was a trading place in olden days, but it has increased very little in the past twenty years. It is beautifully situated in the vale of Cherwell, in the north corner of Oxfordshire. The population in 1871 was 11,276, and at last census it was 12,127, which in both instances included the adjoining hamlets, and the chief trades carried on are the manufacture of steam engines and the Banbury reapers and mowers. To avoid river pollution, it was compelled to

provide a farm for irrigation, and one extending to 238 acres was purchased some twelve or thirteen years ago, across the river in Northamptonshire. The town was fortunate in securing it, for the rent paid before the purchase was £4, 10s., and as it cost a trifle less than £100 an acre, the rent is calculated at £3, 15s. One hundred acres meantime is let to a tenant; 132 acres is under sewage, and it is managed in behalf of the town by Mr Garrett, who is also town surveyor.

The town is supplied with choice water, the total quantity of solid matter in the gallon is 23 grains, and 14 per cent. of the solids is carbonate of lime—so it will vie with the "Banbury cakes," which have been famous for generations. About 245,000 gallons is the daily supply, and it is pumped from the river from which it is drawn, through a fine bed of gravel and sand by downward filtration. The same engine pumps the sewage, which is estimated at 350,000 gallons a day. An 18-horse power engine did all the work when we first visited the place, and it lifted the sewage 21 feet. But as one of the incidents that increase the rates in towns, a new boiler, engine, and other appliances had to be provided at a recent date, which cost nearly £1800. The engine is at work about 9 hours a day, and 220 to 250 tons of coals are consumed in the year, at a cost of £130 to £150. About £220 are paid annually for farm labour, which includes the engine driver, whose salary is 26s. per week. Altogether £4000 were originally spent in engine, buildings, main, levelling, draining, and laying out the farm. The land, being mostly of a tenacious character, was drained before sewaging was commenced, and although little of the sewage passes downwards through the soil, the effluent water passes away in a satisfactory state.

There are 77½ acres in permanent grass, which is overflowed by the Cherwell when in flood, at least to some extent; but as the water does not remain long, nor leaves any mud deposit, it is seldom that any damage is sustained. This portion is irrigated by the sewage during winter, and after the first cutting. As there is no provision for discharging the sewage in rainy periods, it is discharged on this meadow, however wet it may be, and the grasses on these old meadows have become finer since the sewage was applied. The first cut of this meadow was sold this year (15th June 1883) at £3, 16s. per acre. It is a fine crop of fine quality, and the hay estimated to weigh 50 cwt. per acre. The Italian rye-grass is three years down, and is mowed three times in the summer. At the first auction this year, it commanded £4, 6s. 6d. per acre, which may amount for the three mowings to from £16 to £18,—of course the competition and prices are greater in dry summers. The course of cropping is as follows—rye-grass three years, mangels fourth year, and lastly oats with seeds.

We inspected this farm in 1875, and the cropping and the prices obtained for the produce that year were as follows:—

	Extent.		Sales.			Average per acre.		
	Ac.	ch.	£	s.	d.	£	s.	d.
Permanent grass and hay,	77	5	633	18	0	3	3	7
Rye-grass, . . .	24	4½	408	10	0	16	14	2
Wheat, ...	8	5	102	0	0	12	0	0
Oats, ...	8	7½	122	10	0	14	0	0
Mangold, ...	13	1¼	180	1	0	13	14	4
Shootings, . . .	...		4	0	0	...		
	132	3¼	£1450	19	0	£10	19	3

It appears that there has never been so much realised in any one year since 1875—the average sum obtained for the produce being only about £1000. The remaining 100 acres was let to a tenant at the average rent in the year referred to, but the tenant left the farm, and the present tenant took it at £3, 6s. per acre. In consequence of the bad seasons, the Board has allowed £50 per annum for three years, as an abatement of rent, which reduced it to £2, 16s. He however gave notice to leave at the following Michaelmas, and an arrangement has been come to for the tenant to remain at £2, 10s. It was stated that the labour on the sewage farm amounted to £220, which included the engine man at the pumps and the hire of horses, but it did not include the labour of the horses belonging to the Board, which might be put at £20 per annum. In regard to the falling off in the returns from the sewage farm, Mr Garrett refers it mostly to the seasons, and to the lower prices obtained for the produce. As an example, he states that good hay is not making more than £3 per ton.

Banbury was reputed the best paying sewage farm in England, but a great change for the worse has taken place. Upon little more than 130 acres, a reduction of £450 per annum is a very large sum, but like all similar investments a good deal must be put to the account of the improved sanitary condition of the town.

Northampton Irrigation Farm.

It is now more than eleven years since extensive works were erected between the town and the river Nene for cleansing the sewage, but every appliance failed to bring out satisfactory results. The sedimentary matters were removed, but the liquid though clarified was not purified. The effluent water held in solution much of the fertilising ingredients, which on exposure to the atmosphere smelled badly in the nostrils. The premises,

which consisted of two large reservoirs, are now used as settling ponds, and the sewage flows away by gravitation in a sewer, a distance of four miles, to the lands which were purchased for receiving it.

The corporation bought a farm of 327 acres in the parish of Ecton, in the valley of Nene, and although part of the land is subject to flooding, no better spot could have been selected for the purpose. One hundred and fifty pounds an acre was paid for the land, besides the costs of a compulsory purchase. One thousand acres were asked for and granted, but not taken up, owing to the high price. The soil is a sandy loam of some depth, resting on an undulating clay, and a large part has been drained three chains apart, and mostly 6 feet deep. Thirty acres are subject to flooding by the river, as well as a meadow of 22 acres. At the outset, when the work was begun, the land was very much out of order and full of weeds, which involved a considerable outlay in paring and burning the foul turf. In this work, and in reclaiming, levelling, draining, and in constructing the carriers, hydrants, and sluices, £16 per acre were expended. A brick culvert is laid down on the high side of the farm, which is connected with earthenware pipe carriers, from which open carriers and earth ruts are employed for the distribution of the liquid over the surface.

It is estimated that three millions of gallons of sewage flow out to the farm every day, and more than 50,000 inhabitants contribute to it. (Within the parliamentary boundary there were 44,871 inhabitants in 1871, and in 1881 there were 56,551.) Were this quantity of sewage distributed equally over the land, a simple calculation would show the great depth of liquid which is poured over the land in a year. The distribution, however, varies with the crops. Rye-grass and mangels take almost any amount, but none can be applied to the corn crops during the growing season. The root crops are grown on the ridge system, or in drills of ample breadth, which gives space for the flow of the liquid, and the horse-hoe or grubber can be worked earlier and with more freedom than in flat cultivation.

This farm can be all irrigated with the exception of about 20 acres, and as will be seen by the table of cropping, 23 acres are under osiers, which receive dressings of sewage continually, except in the month of April. This crop requires careful management, and the price varies much. White peeled may be quoted at £15 per ton, buffed £21, and brown £3, 10s. The whole of the corn crops were good, too good, for there were portions laid, and the quality was in consequence much impaired. Mr Goosey, the farm manager, estimated the wheat at 6 quarters an acre, the barley at 8 quarters, oats at 9, and the beans at 5 quarters. The rye-grass was sold at 20s. per ton in April and May, and dur-

ing the four following months at 13s. 4d. At these prices, abou £25 per acre was realised for the best beds; but the parts which had been under-cut for four years did not exceed £10 to £12. About 10 acres were made into hay, but the quality was inferior, and difficult to harvest. Mangolds range from 40 to 60 tons per acre, and some have been sold on the ground at 12s. per ton. Swedes average 30 tons an acre, and command about 15s. per ton after topping and tailing.

A large stock of swine has been purchased, and at our last visit there were 80 on the farm. Forty were ready for market, and would make £5 to £6. They are fed mainly on barley grown on the farm, which at current prices was not worth more than 25s. per quarter.

The farm is wrought along with 56 acres of grass land under rental, and there were fifty cattle in the yards of the sewage farm which were to be sold off as fat before the 25th of March, which were expected to make from £25 to £35. As with the crops grown on the Bedford farm, the farm committee resolved to keep stock on the farm to consume what could not be disposed of with advantage. For example, if the swedes do not make about 15s. per ton or thereby, they will be retained for consumption on the farm. The same remark applies to mangels and rye-grass but as a rule, there is a considerable demand from Northampton and neighbourhood. The cropping of the farm in 1875 and 1882 was as follows:—

	1875.	1882.
Mangold,	44 acres.	23 acres.
Swedes,	24 „	24
Kohl-rabi,	10½ „	...
Beans,	25½ „	21 „
Wheat,	24 „	35 „
Barley,	16 „	32 „
Oats,	...	24 „
Cabbage,	26 „	...
Potatoes,	8 „	...
Carrots,	4 „	...
Rye-grass,	24 „	30 „
Hay with clover and seeds,	44½ „	50 „
Pasture,	17½ „	25 „
Osiers,	23 „	23 „
Meadow,	22 „	22 „
Roads, houses, &c.,	14 „	18 „
	327 acres.	327 acres.

The cultivation of kohl-rabi, cabbage, potatoes, and carrots were not included in the cropping of 1882; but cabbage as a heavy cropper, and as taking a number of dressings of sewage, will be more or less cultivated. In introducing live stock, we omitted to state that extensive and commodious buildings have been erected at the entrance to the farm. They consist of a

dwelling house for the manager, yards for cattle and pigs, stables, warehouse for osiers, &c., which cost about £4000. As far as we could estimate, the annual cost of labour and management in 1875 was very close on £1500, which would be 91s. per acre; but we think some part of it represented the laying out of the farm, which was not then entirely completed. As will be seen from the following balance sheet for the year ending on the 25th March 1883, the labour and management is slightly under 80s. per acre. The land has palpably increased in fertility since 1875, and the intelligent manager seems confident that the farm will pay. Some express misgivings on the subject; but as stock is now the sheet-anchor in ordinary farming, we may expect that the introduction of live stock will lead to better results.

Balance Sheet for Year ending March 25, 1883.

Dr. Estimated value of horses, implements, stock, and crops on 25th March 1882,	£3699	4	0				
Sundry debtors,	437	0	5				
				£4,116	4	5	
Payments, viz.—							
Farming,	£1146	0	9				
Stock,	1910	14	6				
Osiers,	495	8	9				
Salaries,	152	10	0				
Advertising, office expenses, printing,	135	7	2				
Rates and taxes,	196	7	6				
General repairs,	171	13	0				
Plant,	58	4	9				
Rent of grass land, 56 acres,	110	0	0				
Dog-cart and hire of ditto,	33	11	0				
Miscellaneous,	13	1	5				
				£4,422	18	10	
Liabilities, 25th March 1883,				215	17	10	
Profit,				1,326	19	8	
				£10,082	0	9	
Cr. Liabilities, 25th March 1882,				£143	13	0	
Receipts—							
Farm produce,	£1696	9	4				
Osiers,	874	6	2				
Stock,	3293	6	10				
Drain tiles,	1	14	6				
Shooting,	15	15	0				
Eggs and poultry,	20	14	6				
Miscellaneous,	0	10	6				
				£5,902	16	10	
Sundry debtors, 25th March 1883,				618	16	5	
Stock on hand—							
10 Horses and 2 yearlings,	£262	10	0				
70 Beasts,	1107	0	0				
Carry forward,	£1369	10	0	£6,665	6	3	

Stock on hand—	Brought forward,	£1369	10	0	£6,665	6	3
87 Ewes and 100 lambs,		407	8	0			
64 Pigs,		81	12	0			
100 Head of poultry,		10	0	0			
Corn in stack and granary,		320	7	0			
Hay, straw, and manure,		243	0	0			
Roots, growing crops,		87	10	0			
Tillage implements and tiles,		482	19	0			
Osiers,		374	8	6			
					£3,416	14	6
					£10,082	0	9

Variations in Live Stock.

No. on 25th March 1882.	Bred.	Bought.	Sold.	Died.	No. on 25th March 1883.
62 Cattle,		79	80	1	70
368 Sheep,	100	112	375	8	197
11 Horses,	...	3	2	...	12
5 Pigs,	48	104	91	2	64
447	157	298	548	11	343

It will be seen that no rent is charged in the balance sheet for the sewage farm, there is just the rent of the 56 acres of the grass land of East Haddon, so the thirteen hundred and odd pounds entered as profit is in reality not a profit. In adding the purchase of the farm, the laying it out, and the buildings, it will be found to amount to £180 an acre if not more, which would be, say £7 an acre for rent, then add to that labour, rates, and sundries, and the sum would look rather formidable; still there are many sewage farms in a worse position financially.

In the process of levelling the ground for the flow of the sewage, where the surface was removed to fill up the low places, there is now little deficiency of the crops; but by the diffusion of the fluid over the natural soil, it gets more than is requisite, hence the corn crops are liable to be laid. It may be further noticed, that there is no provision for overflow in a time of heavy rain, so all that comes must be discharged on the land. The aquatic osiers become a safety-valve then, and as will be seen last year's sales of them amounted to nearly £900. We said that ten acres of the rye-grass were made into hay, and that the quality was inferior, owing to the difficulty of converting the green and juicy stuff into good hay. There is necessarily a large breadth under this crop, and it is cut four or five times in the season; the difficulty is to get such a large quantity of succulent food profitably utilised. In a long interval of dry hot weather, it is possible to make it into hay, but that seldom

occurs in these years. Recently we were pleased to notice a paper on this subject by Mr J. A. Clarke, in which he refers to artificial drying as practised by Mr Champian on the Reading sewage farm. The corporation has purchased one of Mr Gibb's hay-driers at a cost of £350, and with this machine the heavy crops of grass are converted into sound hay, which will keep for any length of time. The hay is reported to be good, and the process is as follows:—When mowed, the swathe is in a brief time turned, and after three or four days' exposure it is carted out of the swathes into a pasture field. It is there put into considerable cocks arranged close around the drying machine, in which it gets warm, and parts with a considerable quantity of moisture. It is then put through the hot-air machine at a quick pace, as fast as a couple of men can pitch it, which finishes it in a condition fit for ricks of the largest dimensions.

The process is costly, inasmuch as the crop has to be removed bodily from off the land on which it is grown, to make way for the irrigation of the next cutting, and as pasture land has to be provided for the process, it is more or less wasted, if occupied. week after week for the four or five cuttings of the season. Then again, the £350 for the hay-drier is a pretty costly investment for a small farm; but if it makes the growing of Italian rye-grass profitable it may well be adopted. Its cultivation is a necessity, and as Mr Clarke puts it—what the cattle want, is of all things dry provender, seeing that they must consume an immense quantity of the watery grass fresh cut. Assuming that 20 acres are to be saved in that way, and that four cuttings amount to 120 tons, being 1½ ton of hay for each cutting, estimated at £3 per ton, the aggregate value would be £18 per acre. That looks like paying, if the costs are not too much. The system of ensilaging might also be tested for preserving sewage grass, although misgivings have been expressed in dealing with materials so full of water. If it is successfully done with ordinary meadow grass off the scythe, as is now demonstrated, it surely can be successfully carried out with sewage grass. It contains 70 to 75 per cent. of water, and the sewage grass does not probably hold more than 85 to 90 per cent. of moisture.

In disposing of the sewage drainage of towns by irrigation, there is indeed a great waste of fertilising material, yet it is probably the least wasteful of any; but the financial results are unsatisfactory in almost every case. It may be that in some such direction as we have indicated the excrementitious matters of towns may be turned to more profitable account. The sanitary question, however, is paramount and compulsory, and dwarfs the agricultural as it would not and could not be permitted to discharge the drainage into streams, which supply

the drinking water to towns lower down the river. Where sewage can be conveyed to the farm by gravitation, the Bedford farm and others, consisting of land adapted for sewage, would pay their way, unless the initial costs are heavy. Where land requires draining, and is very deeply drained, the liquid comes from the drain mouth a brown fluid with a strong smell. Drains are put in to carry off an excess of moisture from the land, and they fulfil their functions, whether that moisture be rain water or liquid manure, so in such soils there is a waste of fertilising matter. Much depends upon the land, and also upon the level of its surface; and there are scarcely two towns alike as to facilities for the discharge of sewage upon land, and its most profitable application. Sir John Lawes and Dr Gilbert of Rothamstead state that the direct result of the general application of town sewage to grass land (by that we understand permanent grass) would be an enormous increase in the production of milk, butter, cheese, and meat. Many of the managers of English sewage farms do not speak highly of the use of the liquid on such fields, and this may perhaps be owing to the deposit left on level land. The case is different with Italian rye-grass, which is mowed three or four times in a season, and it must be to this that these gentlemen refer.

Situation and circumstances entirely govern urban authorities in the disposal of their sewage. Some time since, we visited a town having a population of about 23,000, and found that it only possessed 20 acres of irrigation land. Filtering beds and settling ponds with other appliances were in use, but they all failed, and were inadequate for discharging a purified liquid. So after all the costs which have been incurred, a great expenditure has to be incurred a second time. Negotiations were opened with a neighbouring proprietor, who would not treat with the authorities for a ninety-nine years' lease, but sell the land at £250 an acre! This kind of thing has been too common, and certainly it is far from commendable, for its agricultural value is not more than £40 to £50 an acre. The only course open to that place is to inquire whether they cannot with more advantage deal with a desiccated and inodorous compound, as in the A. B. C. process, which is described in the following pages. The Native Guano Company at Aylesbury are prepared to undertake the work of dealing with towns so situated.

Aylesbury A. B. C. Process.

The mode of dealing with the sewage at Aylesbury has commanded some attention in past years from urban authorities. At a concession of £200 a year from the town, the Native Guano Company have saved the borough from nuisance and the risk and cost of investing in a sewage farm. By the use of

natural agents, they extract and preserve the dissolved and suspended impurities of sewage, by what is called the A. B. C. process, and it is sold as a dry portable manure at £3, 10s. per ton. There was a large show of farm and garden produce grown by this manure in October 1882 at Aylesbury, and finer samples of corn, turnips, potatoes, onions, &c., could scarcely be got together. The value of the manure was thus demonstrated to the many visitors of all classes who attended the exhibition. This system of sewage treatment has been in operation for seven years, with pretty satisfactory results. Votes of satisfaction have been annually passed by the Aylesbury Sanitary Authorities. The process is attended with no nuisance, and the effluent water may be passed into any brook or river.

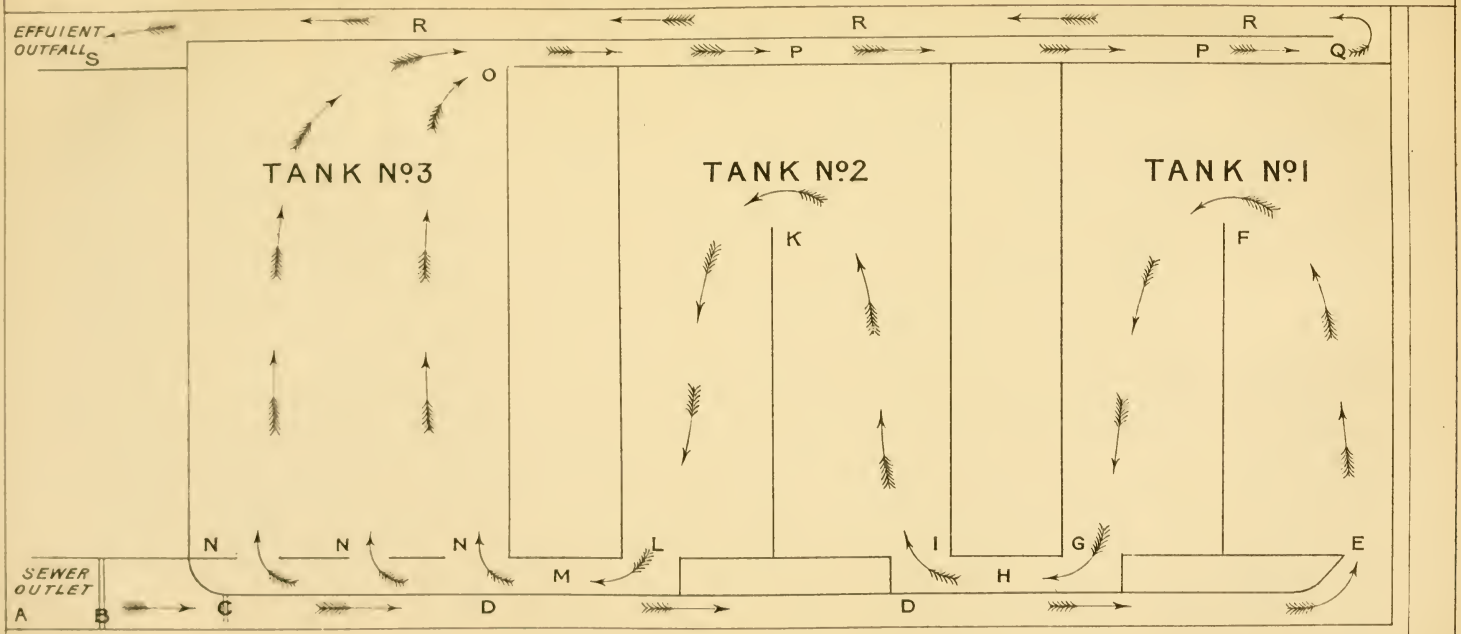
Aylesbury has a population of 8000, and the daily quantity of sewage is about 250,000 gallons in dry weather, but much more in wet seasons. The name of the A. B. C. process is derived from the initial letters of the principal constituents of the precipitants—namely, alum, blood, clay, and charcoal. The clay and charcoal, and where necessary a little lime, are finely ground up with water to form an emulsion, and mixed with the sewage ; a solution of alum is then added. It will best illustrate the process to give the plan of the tanks and the explanation.

The sewage of the town flows to the works by gravitation, and is discharged from the sewer at the point marked A, where there is a grating to arrest rags, &c. It receives here from the trough marked B the proper proportion of the purifying mixture, which at once removes all offensive smell, and after flowing a few feet the precipitating agent is added from the trough marked C.

The sewage now having received all the materials necessary for purification flows along the channel D to tank No. I. entering at the point marked E, and thence through the tank passing round the partition board marked F, through the outlet G, into the channel H, where it may be compared with the sewage flowing into the tank, and it will be observed that most of the solid impurities have been deposited. The water now passes into the tank No. II. at inlet marked I, round partition board marked K, through outlet L, into channel marked M, where it will be seen that it has become still clearer and brighter. It now flows through the inlets marked N into tank No. III., and passing slowly through is discharged at outlet marked O, into the channel P, thence flowing round the partition board Q, into channel R, to the outfall S, where it is finally discharged in a purified condition, within the requirements of the Rivers Pollution Act, and fit to flow into any river.

It should be further explained, that when sufficient sludge has been collected in the first tank, the treated sewage is shut off

Plan of the Tanks



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from it, and made to flow into another. As much of the water as possible is run off from the mud, and the latter is drawn into the acidifying tanks. From these the semi-dry mud is further dried by heat in revolving iron cylinders, which discharge it at one end. The dry powdery mud is then packed into bags for transport.

The old process of precipitation by lime and other processes were, we believe, tried here and elsewhere; but the Aylesbury Company have been working for the past seven years in the manner described, and the Local Board have recently renewed the agreement for another seven years at an increased subsidy. The cost of the works is about 10s. per head of the population for small towns, and for larger places it is much less. The cost of works is estimated at £8000 for 50,000 inhabitants, and the cost of working (viz., materials, labour, &c.) depends largely upon the position of the town, &c. The A. B. C. Company undertake to effectually treat and dispose of the sewage of any town, entirely relieving the authorities from all trouble, risk, and responsibility, for a fixed annual subsidy. There is no fixed scale, but generally the payment amounts to about 1s. per head, if suitable works are constructed by the town. It would have been of great advantage to many towns, if the Aylesbury plan had been adopted instead of purchasing or renting a sewage farm.

The sewage is all dealt with at Aylesbury, except only in times of heavy rains, when the sewers are relieved by storm overflows. As in too many other towns, the storm water is carried into the sewers, and no process can cope with the immense quantities of such water after heavy and continuous rains. Of course, the sewage is at these times so largely diluted, that after the first flushing of the sewers, it is very little worse than the rivers in flood times. Still at these periods, about three times the ordinary average dry weather flow is dealt with, and much more could be done with additional tanks. In this respect the Aylesbury plan has the advantage of irrigation farms, inasmuch as when drenched with rain, sewage cannot be distributed over them without detriment to the crops.

The obliging and intelligent Secretary of the Company, Mr Stevens, states that Aylesbury is the only place where the A. B. C. system is actually in operation at present, but several towns have the system under consideration. The Company patented the invention, and in the evidence before the Committee of the Privy Council, particulars are given of the materials and of the process of purification.

Clay, which is by far the largest substance in use, carries down the suspended matter, the alum coagulates the clay, to which the blood also contributes, and the animal charcoal purifies the materials and absorbs the gases. The result is that

the whole of the solid impurities, and a good deal of the dissolved substances are carried down in the form of clots and flocks, and the supernatant liquid is sufficiently purified to run into any river. This is fully evinced by the local authorities, and by a large number of scientific witnesses who were examined before the Privy Council, as well as by the thriving state of the fish in the defecated water.

The fertilising power of sewage when not overpowered with water is unquestionable, and the dried mud obtained by the purifying process would probably be threefold its actual manurial value but for the A. B. C. materials which constitute so large a part of its weight. This fact explains the reason why the dry product does not show well when tested by chemical analysis; but the good practical evidence of its value when applied in quantity is proved by many testimonials of gardeners and farmers who have been using it. The early estimates of the value of sewage were greatly exaggerated, but when it is considered that a gallon weighs a little over 10 lbs., and that there are only 60 to 100 grains of manurial matter in the gallon (7000 grains to the pound), we arrive at sounder views as to the value of sewage, and the enormous amount of water with which the manure is diluted. The liquid excreta of man, it may be stated, has a high manurial value, and as the A. B. C. process does not extract or precipitate all the manures in solution, doubtless the comparatively low fertilising power of the "native guano" is partly owing to that circumstance.

During an official trial on the purification of London sewage by the A. B. C. process, there were used 80 tons of dry A. B. C. materials, whilst the "native guano" obtained amounted in a dry state to 131 tons, showing an increase of more than 63 per cent. The amount of sewage treated during this time was 11,672,000 gallons. Therefore one ton of dry guano was obtained from 89,100 gallons of London sewage. The quantity of materials required to purify sewage depends upon the character of the water, as well as upon the proportions of those ingredients. For the nature, too, of the manufacturing refuse of towns, the proportions of those ingredients have to be altered. As we have already said, farmers speak highly of the application of this native guano to all crops. The quantities used for the acre are very much the same as the cost of other artificial manures. For wheat a dressing of from 4 to 8 cwt. is put on the acre in autumn, and oats and barley get 6 to 10 cwt. at the time of sowing. For turnips, swedes, and mangels, 8 to 12 cwt. per acre, in row or broadcast, is applied to the acre.

THE AGRICULTURE OF THE COUNTY OF STIRLING.

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[*Premium—Ten Sovereigns.*]

The county of Stirling is bounded on the north by Perthshire, and by the river and Firth of Forth. The parishes of Logie and Lecropt are north of the Forth, and the parish of Alva is a detached portion of Perthshire. On the east side the county is bounded by the Firth of Forth and the county of Linlithgow, on the south by the counties of Lanark and Dumbarton, and on the west by Dumbartonshire and Loch Lomond. The greatest length of the county from east to west is 36 miles; but following the curvature of its outline from Linlithgow bridge to the neighbourhood of Inversnaid, Loch Lomond, in the west, it is 45 miles. The greatest width is about 18 miles; but in the west it is less than 5, and the average width of the county is about 10 miles. The area of the county as given in the Return of Owners of Lands and Heritages in Scotland, 1872–3, is 284,751 acres, and its gross annual rental was then computed at £521,406, 11s. From the same record it appears that, in the county, there were 848 owners of land of one acre and upwards, who were estimated to possess 283,468 acres, at a rental of £413,190, 2s., being a little over £1, 9s. per acre; and 3409 owners of less than one acre, who owned 1283 acres, at a rental of £108,216, 9s., being upwards of £84 an acre. The most extensive proprietor is the Duke of Montrose, who is entered as owner of 68,878 acres, with a rental of £15,706 a year, or less than 4s. 7d. an acre. In the eastern part of the county, Mr Forbes of Callendar has 13,041 acres, at a rental of £12,795, 16s., or fully 19s. 8d. an acre, besides £3419, 10s. for minerals; the Earl of Dunmore, 4620 acres, rented at £8072, 10s., or nearly £1, 19s. an acre, and £850 for minerals; the Earl of Zetland, 4656 acres, at £9552, or upwards of £2, 1s. per acre, and £4255 for minerals. In the county there are twenty-six parishes, and the population in 1881 was 112,798, an increase of 14,580 in ten years.

In the agricultural returns for 1882 issued by the Board of Trade, the total area of the county is stated to be 295,285 acres. The total acreage under crops, bare fallow, and grass was 114,543 acres. Under corn crops there were 31,450 acres, of which there were 2786 acres wheat, 4846 barley and bere, oats 20,345, rye 70, beans 3389, and peas 8 acres. Under green crops there were 9174 acres, of which 4066 were under potatoes, 4589 turnips and swedes, 16 mangold, 15 carrots, 81 cabbage, kohl-rabi, and rape, and 407 vetches and other green crops, except clover or grass. Of clover, sanfoin, and grasses under

rotation, there were 25,220 acres; permanent pasture or grass not broken up in rotation (exclusive of heath or mountain land), 46,679 acres; flax, 64; and bare fallow or uncropped arable land 1956 acres. Of horses, including ponies, as returned by occupiers of land, there were 4862, of which 3301 were returned as used solely for purposes of agriculture, &c., and 1561 were unbroken horses and mares kept solely for breeding. There were 28,991 cattle, of which 10,081 were cows or heifers in milk or in calf; and of other cattle there were 9106 two years old and above, while 9804 were under two years of age. Of sheep there were 111,658, of which 71,667 were one year old or upwards, and 39,991 were less than one year old. There were 2162 pigs.

The capital of the county is the royal burgh of Stirling. The landward part of the parish does not cover more than 200 acres; but within the parliamentary boundaries are included parts of Logie and St Ninians; and the small village called the Abbey, which occupies the place where once stood the abbey of Cambuskenneth, belongs to the burgh, though it is situated in a northern link of the Forth, in the county of Clackmannan. The population within the parliamentary boundaries was 16,010 in 1881. Stirling unites with Culross, Dunfermline, Queensferry, and Inverkeithing in electing a member of Parliament, and the present representative is Mr H. Campbell Bannerman. The town is of considerable antiquity. Buchanan mentions it frequently as existing in the ninth century, but gives no description of the place. The earliest known burgh record is a charter dated the 18th of August 1120, given at Kincardine by King Alexander I., but that only confers some additional privileges on the burghers and freemen, and is not a charter of erection, as the burgh had existed long before. With Edinburgh, Berwick, and Roxburgh it formed "the court of the four burghs," an institution found in existence at the dawn of our national history, and from which is supposed to have emanated a collection of the laws of the burghs in the time of David I. In 1368, when Berwick and Roxburgh had come into possession of the English, Lanark and Linlithgow were substituted for them. This burgher parliament made laws and regulations for trade, and for the management of burghal affairs. In 1454 it was fixed by royal charter that Edinburgh be the place of meeting. The four burghs summoned others to their council, and thus arose the Convention of Royal Burghs, which, though now somewhat antiquated, was a most useful institution in its day.

About the middle of the twelfth century, Stirling had become a royal residence, and in it David I. kept his court, probably to be near Cambuskenneth, where he had founded an abbey in

1147. No doubt the district shared the benefits which flowed from the superior style of agriculture introduced by David, and sedulously carried out by the monks in the various monasteries founded by him. The condition of the district at a more recent, but still remote period, may be illustrated by the statement that in 1263 the sheriff of Stirling was employed in repairing the ancient park, and in constructing a new park for King Alexander III., for which he was allowed £80; and twenty years later there was an allowance for two park-keepers, and one hunter of wolves at Stirling; and for the expenses of four hundred perches of palisade round the new park, and for mowing and carrying hay and litter for the use of the fallow deer in winter.

In the arrangement of "metts, measures, and weights" for the kingdom, Stirling had the custody of the standard pint, which was to weigh of the water of Tay 41 oz. or 2 lbs. 9 oz. In the reign of James II. it was ordained that "a general measure be observed, according to the pint and quart formerly given to the burgh of Stirling, for one universal standard, whereof each firlot to contain 18 pints, and of this pint, quart, and firlot three standards to be made, and given to Aberdeen, Perth, and Edinburgh." It was likewise ordained that "the wheat firlot shall contain 21 pints and a mutchkin of the Stirling jug, and that the firlot of bear, malt, and oats shall contain 31 pints of the same." The jug is now in the Smith Institute. It is made of brass or yeltine, and weighs 14 lbs. 10 oz., and on it is the lion rampant. It was lost in 1745, but was recovered by the Rev. Alexander Bryce of Kirknewton, in the garret of a tinsmith in the town. In 1826 it was, by authority of the town council, sent on loan for an exhibition of ancient scientific articles at South Kensington.

Stirling is remarkable for the number of its hospitals. One was founded by Robert Spittal, tailor to King James V., who left an endowment for the support and relief of decayed burgesses. Another was founded in the year 1633 by Robert Cowane, merchant in Stirling, for the support of twelve Guild brethren; and this property has greatly increased in value, a good deal of the land having been feued. A third was founded in 1725 by John Allan, writer in Stirling, who "mortified" 30,000 merks for the maintenance and education of the children of poor tradesmen.

Toward the close of the sixteenth century, Stirling had become a manufacturing town, and a kind of worsted stuff called shalloons was made, quantities of which were exported to the low countries. Early in the eighteenth century the manufacture of tartan was begun, and it flourished till about 1760, after which it declined; but later in the century the manufacture of carpets

became prominent, and there were thirty or forty looms constantly employed in this work. Near the close of the century cotton manufacturing was added; and about the year 1793 there were 260 looms employed in weaving coarse muslin. At the same date wool-spinning was added, and one firm had 100 persons engaged in teasing, combing, and scouring wool, making it ready for spinning. The manufacturing industry has been still further developed in various departments. There are four woollen mills, all of considerable importance, in which there is spinning of yarns for the manufacture of tweeds, shawls, and fancy stuffs, at Forthvale Mill; and at Parkvale and Hayford Mills, dyeing, spinning, and weaving. The town has a good reputation also for coachbuilding. In Stirling there is a weekly grain market, where a large business is transacted. The sales of grain in the three years beginning with 1880, as supplied by the market clerk, were—

	Wheat.	Barley.	Oats.	Beans.	Tares.
	qrs.	qrs.	qrs.	qrs.	qrs.
1880, . .	2375	9,686	17,012	1986	...
1881, . .	811	10,459	16,056	1797	103
1882, . .	1390	9,559	19,123	3205	27

A good business is also done in malt, coals, wool, timber, bricks, tiles, lime, and agricultural produce.

Falkirk was in 1600 created a burgh of barony, and in 1647 was made a burgh of regality by King Charles I. It is likewise a parliamentary burgh, and unites with Linlithgow, Lanark, Airdrie, and Hamilton to elect a member of Parliament. The present representative is Mr John Ramsay of Kildalton, island of Islay. Falkirk is a flourishing town, with some good public buildings and rich surroundings, both as regards agriculture and ironworks. In 1871 the number of inhabited houses in the parliamentary burgh was 1238, and the population 9547; in 1881 there were 2721 inhabited houses and 13,170 of a population. For agricultural stock there is an auction mart, where a good business is transacted in store and fat cattle. Partly in Falkirk and partly in Bothkennar parishes is Grangemouth, which has during the past thirty years risen to the position of a high-class port, with accommodation for large vessels. In 1871 there were 132 inhabited houses belonging to Grangemouth in Bothkennar parish, and 651 inhabitants; in 1881 there were 267 inhabited houses, and 1412 inhabitants. In Falkirk parish there were belonging to Grangemouth 121 inhabited houses in 1871, and 1659 inhabitants; in 1881 there were 572 inhabited houses, and 2918 inhabitants. Kilsyth is a burgh of barony; and other towns, with a population of 2000 or upwards, are Lennoxtown, Alva, Bannockburn, Bridge of Allan, and Denny. There are about a hundred villages and hamlets.

Rivers.

The principal river connected with Stirlingshire is the Forth. Its source is a spring on the northern side and near the top of Ben Lomond. The stream is, for the first eight or ten miles of its course, called the Water of Duchray; then it enters Perthshire, passing under the name of Avondhu, or the black river; after which, returning to Stirlingshire, it assumes the more familiar name of the Forth. It is a dark and sluggish stream, very unlike any ordinary Scottish river, and in its noiseless meanderings resembling the Northumbrian river Till. Winding round the base of Craigforth, near Stirling, it receives from the north side the clear waters of the Teith, and is joined by the Allan just opposite the town. Below Stirling the river, increased in dimensions by the tide, is curiously zigzag in its movements, forming what are called "the links of the Forth." From Alloa eastward it becomes an estuary, and is known as the Firth of Forth. The Carron rises in the interior of the county, and, flowing eastward, joins the Forth at Grangemouth. The Endrick, a fine trouting stream, rises about the centre of the county, and flows westward through a finely-wooded valley, with a good deal of arable land, into Loch Lomond. The other streams are the Avon, the Kelvin, the Blane, the Devon, and the Bannock.

Geology.

Geologically, the county of Stirling is in the centre of the great midland valley, which is bounded on the north by the Lower Silurian rocks, rising into the rugged schists and gneisses of the Highland mountains, and on the south by the same rocks, as developed in the contorted greywackes and shales of the southern uplands. The substratum of the valley is the Lower Old Red Sandstone, which is exposed in the east of Scotland from Stonehaven to the Firth of Tay, and thence extends south-westward across the island to the Firth of Clyde. It contains abundance of igneous rocks, among which the Ochil Hills are conspicuous. Along the southern flank of the Ochils the Upper Old Red Sandstone prevails, till it is overlapped by carboniferous strata. The volcanic material which is developed at the top of the Old Red Sandstone, or base of the carboniferous series, is exhibited in the long chain of heights stretching from the Campsie Fells to the south of Arran. To the lower half of the carboniferous system belong the rocks on which the town and castle of Stirling are built. Near Stirling are the Touch Hills, which are continued westward by the Gargunnock and Fintry Hills, and across the Endrick by the Killearn and Campsie Fells.

None of these attain a height of more than 1500 feet, and most of them are covered with grass, once browsed with Highland cattle, now generally pastured with blackfaced sheep. In the west of the county, including the large parish of Buchanan, the hills belong to the primary formation, and consist chiefly of micaceous schist. The highest is Ben Lomond—3191 feet above the sea-level. The base of the Killearn district is the Old Red Sandstone, and in the higher grounds are trap, freestone, limestone, and clay. In Fintry parish there is coal in small quantities, and there are fragments of granite, besides whinstone, freestone, redstone, jasper, and fine specimens of zeolite. The north-western boundary of the great coal-field which extends from St Andrews Bay to Kintyre runs along the base of the Lennox Hills, and coal is worked in many parts of the east and south, but nowhere in the west and north of the county. Ironstone is found in almost inexhaustible quantities, a fact which influenced Dr Roebuck, after having examined the whole of Scotland, to fix on the neighbourhood of Falkirk as the site for the Carron Ironworks. The richest variety is found at Kilsyth. Limestone in many instances accompanies the coal in two strata, one above, the other below the coal, the former being always the best quality. Sandstone abounds in the south and east districts, and is extensively quarried. Trap rocks, especially basalt, are found north-west of the coal, and rise up in nodulated hills through various parts of the coal-fields. Precipitous columnar cliffs and extensive ranges of basaltic colonnade exist in solitary protrusions, as in the broad mass of the Lennox Hills. A peculiarity of all the hills in the county on or near the carse is that the rocks on the west and south-west sides are bare and precipitous, while the eastern and northern sides have a gentle slope, and are covered with herbage. The reason assigned is that ages ago the waters of the Atlantic rolled through the low country into the German Ocean, and, washing the soil from the exposed ribs of those rocks, left it deposited on the protected sides.

Soils.

In the county there are great diversities of soil, and the different kinds have been classified as carse, dryfield, hill, moor, and moss. Agriculturally, the carse occupies the foremost place, and includes some of the richest land in Scotland. It extends from the junction of the county with Linlithgow to the neighbourhood of Buchlyvie, a distance of 28 miles, with an average width of 2 miles, making in all about 56 square miles, or 36,000 imperial acres. In general the carse land is flat, but sometimes it presents a gentle slope, rising gradually toward the south from the valley of the Forth. It is sometimes 30 feet deep, is

seldom more than 25 to 40 feet above the level of the sea at high water, and contains beds of shells, moss, and marl. A good deal in the parishes of St Ninians, Airth, Bothkennar, Falkirk, and Polmont has been actually reclaimed from the sea at a comparatively recent date. Lord Dundas began a process of reclamation in 1788, and in twenty or thirty years had made 174 acres of land. The Earl of Dunmore, about the same time, reclaimed 170 acres; and other proprietors secured smaller tracts of valuable land. The component parts of carse soil, when analysed, are as follows:—

Water,	10 parts.
Silica,	44 „
Alumina,	28 „
Carbonate of lime,	2½ „
Organic matter,	6 „
Oxide of iron,	1½ „
Soluble salts,	1 „
Soluble matter.	2 „
Loss,	5 „
	100 „

The carse was greatly improved by the thorough draining which followed the adoption of the system devised by Mr Smith of Deanston. Crops were increased in bulk one-sixth to one-fourth in good seasons on the best land, besides an improvement in weight and quality; in cold, wet seasons the improvement was still more obvious. A good deal of the land would now require to be drained afresh. Rents of carse lands in the eastern district rise to 60s. an acre, and in exceptional cases higher; in the central district the best land is from 50s. to 60s., medium land 30s. to 35s., and inferior about 15s. an acre. The lands belonging to the hospitals in Stirling are let by auction, and go higher than ordinary farms.

Dryfield soil in the county varies in quality. In the eastern district, from Linlithgow to Stirling, it is good in quality, equal to carse or nearly so in value, and very favourable for mixed husbandry. In other districts it is light and of poor quality, but intermixed with patches of rich loam. Dryfield soil prevails in the parishes of St Ninians, Polmont, Larbert, Denny, Kilsyth, Baldernock, and parts of Campsie, Strathblane, Slamannan, and Muiravonside. It comprehends the lower or arable declivities of the hills, and the greater part of the vales in the central and western districts. Along the sides of the hills in the parishes of Balfron, Killearn, Kippen, and Gargunnock, there is a tract of land, about 20 miles in extent, which slopes down to the Forth and the Endrick, increasing in fertility as it approaches the rivers. In the vales of the Endrick, the Blane,

and the Kelty, the soil is either a fine light loam, clayey till, or a sharp sandy mould. The subsoil consists of an impervious till, or a still more impenetrable rock of reddish freestone. For dryfield land in the eastern district, the highest rents are 35s. to 50s. an imperial acre, for medium land 24s., and for poor land 12s. 6d. an acre. Grazings are let on the Ochils for 8s. to 10s. a sheep; other hill grazings are 2s. 6d. to 6s. a sheep, counting average of stock for year according to quality. Hoggs are chiefly sent out of the county to be wintered. On the Campsie Fells is some of the best pasture in Scotland for black-faced sheep.

Westward from Stirling, and occupying a large space in the centre of the county, are the hills of Touch, Gargunnock, Fintry, Killearn, and Campsie; and in the parish of Buchanan the hills attain a high elevation; and, north from Buchanan Castle, they are covered with short heath mixed with grass. About one-thirtieth part of the county, in various places, is covered with moss, some of which is incumbent on fine clay, as in the parish of Airth, where there are about 300 acres, with an average depth of 12 feet, covering land of excellent quality. Much has been done to remove this encumbrance by the last two Earls of Dunmore, but, at the present rate of wages, it will not pay, as it requires £30 to clear an acre, while the rent of the land would probably not exceed £2. In former days a good deal of moss land was handed over in small patches to cottars, who were allowed to retain the produce on condition of removing the moss and cultivating the land. For nineteen years they had the land free, for other nineteen at a very moderate rent, and afterwards at a higher rent. They were called "moss lairds," but many of them were poor, and now they are nearly extinct. In the western district of Slamannan parish is a black expanse of poor land which yields very indifferent crops, and several hundred acres of moss from 3 to 12 feet deep, and resting on sand. This would be of no value even were the moss removed.

Climate.

The climate of the eastern district is milder than that of the west, partly because of the less elevation, partly on account of the superior shelter afforded by trees and hedges, but partly also because of the higher summer temperature in the east of Scotland than in the west. In spring the east suffers heavily from fogs and easterly winds; but, on the other hand, the west has more cloud, and a greater rainfall. Crops in the eastern district are about a fortnight later than the early parts of Mid-Lothian. The rainfall is much modified by the direction from east to west, and by the proximity to or distance from hills.

At Balloch Castle, Loch Lomond, near the borders of the county, the annual depth of rain is 54·45 inches; at Firkin, also near Loch Lomond, it is 91·20; at Strathblane, Stirlingshire, it is 47·80; but at Polmaise, near Stirling, it is 37; and at Kerse, near Falkirk, it is only 32·70 inches, or little more than in the neighbourhood of Edinburgh. Often the weather is fine in the flat carse district, when rain is falling only a few miles distant. In winter the higher grounds are covered with snow, or sealed up with frost many times, when ploughing is in progress near the banks of the Forth. In the west the excess of moisture operates against successful cultivation of grain crops; but, on the other hand, the dropping climate is suitable for grass and green crops, and makes the district well adapted for dairy farming. In ordinary seasons, and where the soil is suitable, potatoes are successfullly grown, and the facilities for carriage by land and water are so good that a ready market is found for all that can be produced.

History and Topography.

In the county of Stirling there are not many large estates, but there are some of medium size, and a large number of small proprietors holding of a subject superior. Only the Duke of Montrose and Mr Forbes of Callendar have more than 10,000 acres, and not more than seven other proprietors have 5000 acres or upwards. Other two have 4000 to 5000 acres, other six have 3000 to 4000, six more have 2000 to 3000, and eighteen others have 1000 to 2000, making forty-one altogether who have 1000 acres or upwards. A very large number of proprietors have less than 100 acres, and many small feuars hold of a subject superior. Apart from feus granted at a recent date, many originated in the beginning of the eighteenth century or earlier, when the country was unsettled, property was of little value, and landowners had such difficulty in obtaining tenants that they were willing to let the land on almost any terms. It was not unusual, then, for large proprietors to parcel out tracts of land among their retainers and their heirs for ever, at a rent equivalent to little more than a moderate feu-duty. Much land was thus alienated on the estates of the Duke of Montrose, and the Earls of Mar, Menteith, and Glencairn. The Earl of Wigtown, who was opposed to the Union with England in 1705, believing it would be ruinous to the country, disponed his extensive estates in the parishes of Denny and neighbouring districts to his own tenants, on condition that they would continue to pay the rents of that time. Hence the great number of small proprietors in the parishes of St Ninians, Denny, Campsie, Slamannan, and even in the carse.

In this, as in most other Scottish counties, the earliest improvers of land were among the landed proprietors. In the middle and latter half of last century gentlemen possessed of land worth £200 to £1000 a year lived almost invariably on their estates. Their education had been liberal, their views were enlightened, and, as expenses tended to increase with the development of civilised life, an increased income was needful to cover the gradually growing expenditure. They knew how to adopt the means of improvement suggested by the progress of science, and they had the good taste necessary for adding proper embellishments to their estates. Farmers at that time had not the skill, the capital, or the enterprise which they subsequently acquired, and which transformed them into active and successful improvers of land. At present the tenants are intelligent, industrious, and thoroughly acquainted with the most improved modes of agriculture, which are carried out under strict personal supervision. At the same time, the proprietors continue to interest themselves in the agriculture of the county and the management of their estates; and to the cordial co-operation of landlord and tenant the success of Stirlingshire agriculture is in large measure due.

Entering the county from the east, one of the first conspicuous estates is Callendar,—the second in the county in area and rental. It extends about fifteen miles from Slamannan on the south and east to Denny on the west, and it comes down to the Carron at Camelon and Larbert. It lies in four parishes, and includes carse, dryfield, and moorland soil. The estate was purchased by Mr Forbes in 1783 for £85,000; its present rental is over £13,000 a year. Beginning to improve the estate, Mr Forbes took 4000 of the 7000 acres of which it consisted into his own immediate occupation. He first subdivided the land, throwing that near Falkirk into fields of six or seven acres, which were enclosed with hedge and ditch. The old-fashioned ridges were levelled with five or six ploughings, and the whole was limed at the rate of 100 bushels an acre. The proprietor took one crop of oats, and, along with the oats, sowed clover and rye-grass, after which the lands were let on lease. The remainder of the estate was let to tenants, who were bound to improve it after the example of the proprietor. The total income, including minerals, is now estimated at £19,811 a year. Of this amount £9868 is in the parish of Falkirk, derived from sixty separate subjects, including the mansion-house, garden, and offices, valued at £550; the woods, copse, and underwood, £400 a year, and the colliery of Pilrighill and Standalane, rented at £1463, 13s. 4d. Of the small farms laid out toward the close of last century many have been united, but still the greater number are of moderate size. The highest rent is £523, paid

by Mr Adam Smith; the next highest is £500, paid for Carmuirs by Mr James Fleming, and others are from £450 to £180, but many are less. In the parish of Denny the same estate has a rental of £5078, a good proportion of which is for minerals. In Dunipace there is £1948, in Muiravonside £1984, and £146 in Larbert. The estate is carefully managed. The farm buildings generally are good, and the fences are good on the best land, but not so good on clay soils. Farmers are not restricted in cropping, provided they keep the land clean and in good condition. The leases are generally for nineteen years.

The Earl of Zetland has an estate which is entered in the parliamentary return as extending to 4656 acres, at a rental of £9552, besides what is derived from minerals. It includes a rich tract of land in the parishes of Falkirk, Bothkennar, and Polmont. In Falkirk parish the rental approximates to £6000, but this includes £568, 3s. for a dry dock and ship-building yard at Grangemouth, many rents for houses and business premises, and a considerable number of feu-duties. In the parish of Bothkennar Lord Zetland has two collieries,—one let for £1156, 15s., the other for £233, 5s. 1d., both to the Grangemouth Coal Company. On this estate are many good specimens of carse farms. Kerse House is in the centre of the carse, and the well-wooded park is let for grazing at £370 a year. The highest rent paid for one farm is £380, by Mr John Thomson for Carronflats, Painshead, and part of Inch. Mr Robert Buchan has Dalgrain, rented at £190, and Kerse Mains at £204; Mr Alexander Simpson has West Mains and East Thorn, 100 Scotch acres, at £290; and Mr Marshall has Fouldubs at £262, 10s., and Maryflatts at £85. In the county valuation roll there are in Falkirk parish above 140 subjects, of which Lord Zetland is entered as proprietor; but the great majority of them are comparatively small holdings at Grangemouth, and hardly more than twenty of them are farms, three or four of which have corn mills attached. Most of the farms on the estate are let for about or under £200 a year.

Farther west, and lying along the south side of the Forth, in the parishes of Airth and St Ninians, is the estate of the Earl of Dunmore, entered at 4620 acres, at a rental of fully £8000 a year. In the centre of the carse, but situated on a gentle eminence which commands an extensive prospect, is the mansion-house; and the extensive, beautifully-wooded park is let for grazing at a rent of £1356 a year. In the park there is a considerable expanse of moss, but the cost of labour is so great that there is little chance of having it removed. Formerly Lord Dunmore had a herd of shorthorns; and the home farm, on which was built a steading at a cost of £12,000, is between the

park and the river. The herd has been dispersed, and the farm is now let to Mr William T. Malcolm for £900, being £2, 7s. 6d. an imperial acre. The farm, which many consider the best in the county, includes 100 acres reclaimed from the Forth less than a century since, and is not only rich soil, but also more workable than most of the carse farms. It is in two divisions, one of 200 acres, arranged in six subdivisions so as to suit the six-course rotation, but without a fence in it; the other 180 acres are similarly subdivided. There are twelve acres of permanent grass close to the Forth, on which cows are pastured. Among other farms on the estate of Lord Dunmore are Linkfield, let to Mr John Drummond for £327, 10s.; Plean, a dryfield farm of 333 acres, rented by Mr J. T. S. Paterson at £540; Gallamuir, also a dryfield farm of 340 acres, rented by Mr John Edmond for £550; Carbrook Mains, by Mr Thomas Hope, for £505; Sauchenford, by Mr James Hendrie, for £238, 4s.; Plean Mill, by Mr William Ritchie, at £410; and Rosehill, by Mrs Walter Weir, for £576, 10s.

Still further west, and including the carse lands near Stirling, is the estate of Colonel Murray of Polmaise and Touchadam, with a rental of £10,556, 7s., of which £1018 is for grass parks. The mansion-house is beautifully situated on the wooded slopes of Touchadam; and the lands lie down toward the Forth, about one half of the estate consisting of carse. There are above seventy tenants, a good many of whom occupy farms at a rental of £200 a-year or upwards, but some are of smaller size. Mr James Christie pays £520 for Bandeath, Mr William Edmond £463 for Westerton of Cowie, and others are let from £100 to £400 a-year.

In the parish of St Ninians, a principal proprietor is Sir James Ramsay Gibson Maitland, Bart., who has a rental of £6163, 16s., including £1107, 10s. for grass parks. The farms are wholly dryfield, generally in good condition, and well farmed. The farm of Muirpark is let to Mr James Adam for £321, 5s., and Townfoot and Todholes to the same for £92. Little Sauchie is occupied by Mr James M'Laren at a rent of £430 a-year, and Foot of Green by Mr Nimmo at £341, 5s. This is a well-managed farm, with an excellent steading roofed with slates. The estate is about three miles in extent from north to south, and it contains some remarkably good dryfield soil. It is noted, also, for fine timber and luxuriant grass. The mansion-house is near the centre of the estate; and east from it, in a wooded glen, is Howietoun Fishery, a kind of industry not strictly agricultural, but destined probably to have an important bearing on the production of human food. There are houses and ponds for breeding fish, with complete arrangements for sending ova, fry, and yearling and two-year-old fish to all parts of the country.

The capital invested is large, and the expenses are not small, but the supply is sufficient to stock lochs and streams all over the country. The development of this fishery will be watched with much interest. In the valuation roll the estimated rent is £377 a year.

In the parish of St Ninians, the valuation of which in 1880–81 was £53,243, there are in all 1279 occupancies on the roll, a large proportion of which are owned by small proprietors. Besides many farms of moderate size, there are some smaller tenancies held by men who, with their families, do the whole work, and from these landlords often get a higher rent than is paid by farmers higher in the social scale. They are industrious, hard-working people, who do their work well, pay their rents honourably, and give very little trouble to landlords or factors. There is much good growthy land in the parish, and along the road sides may be seen great abundance of such wild fruits as rasps, brambles, blackberries, and sloes. On the north side of the river, over against the parish, are fully 9000 acres of valuable land belonging to the county from Stirling to Alva. The lands of Airthrey Castle and Westerton are particularly fertile.

In Alva parish the lands are arable and pasture. Near the base of the Ochils the soil is a rich hazel mould, intermixed with gravel and small stones; then there is a bed of moss resting on clay which is 50 to 100 yards wide, and is, in some places, 7 feet deep. Next there is a belt of strong clay, which extends towards the Devon, and meets the haugh lands which is overflowed by the river two or three times a year. The soil near the river is in some places more than 20 feet deep. The size of the farms has recently been increased, and the tendency is still in the same direction.

In the parish of Larbert, further to the south, is the estate of Sir William Bruce of Stenhouse, Bart., the mansion-house of which is one of the oldest in the county. It is a quaint, old-gabled place on a commanding situation, and approached by an avenue of trees of great size. On the estate is a common of eighty acres where the great autumnal Falkirk Trysts are held for the disposal of store cattle and sheep. The village of Stenhouse Muir is also feued off the estate. On the edge of the Torwood Mr Bolton, M.P., has the estate of Carbrook, to which additions have been made lately.

Westward from Stirling, along the valley of the Forth, there is carse of greater or less width, but of decreasing value to the neighbourhood of Buchlyvie. A portion of the land has the look of formerly being covered with peat, and, in the parish of Kippen, begins the great expanse known as the Flanders Moss. The peat begins abruptly, suggesting the idea that improvers in former ages have proceeded with its removal till, for some

reason or another, a sudden halt was made, and the work has never been resumed. Thus it happens that the cultivator runs suddenly against a wall of peat, and for many miles the black encumbrance lies heavy and solid on earth which might otherwise produce good crops. The land near the moss has a diminished value, owing to the moisture which cools the atmosphere for at least half a mile all round. Doubtless the proprietors have looked at the matter on all sides, but it may be suggested that in these days of enterprise and joint-stock companies, some way might be found to utilise the peat either for ordinary fuel or for distillation purposes. If any such company were formed, the proprietors might give great encouragement, considering how largely they would reap the ultimate benefit. From Port of Menteith westward the dairy system largely prevails, and the milk is sent regularly to Glasgow by railway. Complaints are made that the dairy farmers of the district are at a disadvantage because the morning train is not in time for the first delivery of milk in the city, and on this account they cannot get the highest prices. In Campsie parish there is dairy farming and mixed husbandry. The green crop consists chiefly of potatoes, and to a smaller extent of turnips. The oats sown are of the earlier sorts, which are most suitable for the climate. Lime can be had at various places in the parish, and, the soil being generally ferruginous, it acts with great effect. The dairy system is found to be suitable and profitable, and the cows are chiefly Ayrshires. In Kilsyth district, oats, barley, and green crops prevail, but wheat is not profitable. The dairy system is the great industry of the locality, to which all else is subordinate. Potatoes are grown extensively.

In the parish of Killearn there are 15,000 acres, of which 5370 are under cultivation, 8860 are moor, and 1140 woodland. The chief proprietors are the representatives of the late Mr Peter Blackburn of Killearn, Archibald Orr Ewing, Esq. of Ballikinrain, M.P., Vice-Admiral Sir William Edmonstone, Bart., of Duntreath, C.B., and Mr Wilson of Carbeth. Mr Orr Ewing and Mr Wilson occupy their own lands, and both have made great improvements. It is a picturesque district, with a good proportion of arable land in the valley of the Endrick, but much of it not very valuable; on the south are the Killearn and Campsie Fells; on the north, across the valley, is the dark wall of the Highland hills. Higher up the valley is the parish of Fintry, the ownership of which belongs chiefly to the Duke of Montrose and Sir George Home Speirs, Bart., though there are some small proprietors. Eleven tenants pay more than £100 in rent, of whom five are on the Duke's estate, and five are on that of Sir George Home Speirs. The valuation roll shows 112

occupiers in the parish. The highest rent is £772 for Meikle Binns, on the Duke's estate. This farm, occupied by Mr Tod, is elevated in position, and is wholly pastoral, except an expanse of meadow which is cut for hay. Other farms in the upper part of the Endrick valley, such as Lurg, Spittalhill, and Todholes, are wholly pastoral, with the exception of some small fields near the steadings. In Balfron there are 257 occupiers, of whom only twenty-one pay more than £100, and eighty-one are valued at less than £5 a year. In the town of Balfron there is some cotton manufacturing. In the parish of Drymen there is a proportion of cultivation, but the greater part of it is pastoral. Buchanan Castle, the residence of the Duke of Montrose, is situated in a splendid park, finely wooded, and looking down to the broad, level, and grassy haughs through which the Endrick here winds toward Loch Lomond. The grounds are well kept, and the fences connected with the policy and home farm are carefully kept. The county is bounded for about fifteen miles by Loch Lomond; and the principal islands in the loch also belong to it. Inch Caillach, or the Nun's Island, is chiefly covered with oak trees. Inchfad and Inchcruin are arable, and there are many islets of small size. The shores of the loch are skirted with valuable coppice wood, consisting of oak, mixed with ash, birch, and alder. It is all the property of the Duke, and is cut for the bark every twenty-one years or thereby. Patches of arable land, of a sandy soil, occur; but the greater part of the district is fit only for pasture. The parish of Buchanan is estimated to contain 41,598 acres, of which only 2800 are arable, 34,548 hill pasture, and 4250 woodland. It belongs wholly to the Duke, but the Glasgow Commissioners have a foothold in connection with the Loch Katrine waterworks. The largest rent in the parish is £1100, paid by A. Orr Ewing, Esq., M.P., for the lands of Ben Lomond and Blairvockie, which are pastured with blackfaced sheep. The rents of other tenants are nearly all under £500 a year; not more than half a dozen exceed £300; and thirty-nine tenants are under £100 of yearly rent.

Farm Buildings, Machinery, and Implements.

In the eastern district of the county many of the farm houses are good, and some of those recently built are very superior. There is, however, great diversity in farm houses in different districts, and even on different farms in the same district. Cottages in the east of the county are generally fair, but the number is scarcely sufficient. Labourers can, however, be obtained from the villages when required. In other parts of the county there is need for improvement as regards dwelling-houses and

steadings, but especially cottages. Good houses exist in many places, but in other instances they are deficient in accommodation and stability. Dwelling-houses are generally slated; steadings partly tiled and partly slated; cottages slated, tiled, or thatched. All new buildings of any kind are slated. Steadings vary with different districts according to the style of farming, but generally they are fairly adapted to their purpose. Undoubtedly the best steading in the county is on Dunmore home farm, but it was erected at great cost for a special purpose, and cannot be considered a fair specimen. This steading is exceedingly commodious, and contains all appliances for the health and comfort of animals. The frontage toward the south-east is about 100 yards; and the measurement from south-east to north-west is 70 yards. For feeding cattle there are 16 boxes, measuring each 12 feet by 11, and three others, making 19 altogether. A wide passage, with rails for a waggon, between the rows of boxes, gives facilities for the easy and expeditious distribution of food to the feeding troughs, which are alongside of the open passage on either hand. Beside each feeding trough is a separate trough always full to the brim with clear water, which comes by gravitation, and is continuously flowing, so as to be always pure. For wintering cattle there are four courts, each 20 yards square, and each sufficient to accommodate 15 cattle. Over all is a lofty open roof covered with tiles, which are considered better than slates, leaving space for ventilation. There are nine boxes for calves, very commodious and airy. The stables are proportionately excellent, with abundant room, lofty roofs, and sufficient means for ventilation. In a detached building on the north side are sheds for young horses, opening into a paddock that extends down to the river. The thrashing machine, driven by steam, is centrally placed, perfect in construction, and with ready access to the stack-yard, the cattle boxes, and the stable. In the south-west corner of the steading is a smithy, where a blacksmith attends when wanted in the evenings. The stack-yard is on the north-west side; and at a little distance on the south-east is the farm house. Of an ordinary steading on a dryfield farm, a fair specimen is at Gallamuir, also on the estate of Lord Dunmore, and tenanted by Mr John Edmond. It is a quadrangle, of which the stable for work horses, containing ten stalls, forms part of the east side, and the line is continued with feeding-stalls for cattle round the east and north angle. Outside the stalls in front of the cattle is a shed for turnips, with openings through which turnips are deposited in the troughs where the cattle are tied up in stalls. There are 54 stalls for feeding cattle, and, including sheds, there is accommodation for about a hundred feeding and wintering cattle. The courts are partly roofed with tiles. The thrashing machine is driven by steam, and with it

nearly all the crop is thrashed. On the south side of the quadrangle is the cart-shed, over which there is a good granary; and there are suitable arrangements for accommodating young horses, as well as for the storage of manures, and for other necessary purposes. The stack-yard is on the west side of the steading, and is in two divisions, separated by a wide road—a measure of precaution by which a portion of the crop might be saved in case of fire. The farm-house, built five or six years ago, is very commodious, with tastefully arranged garden and lawn. In the west of the county less accommodation is required, and the chief interest is centred in a good and well-kept byre; but the steadings generally are compact and well kept. At Blairoer, in Drymen parish, Mr M'Adam occupies his own estate of 167 imperial acres, all arable except 6 acres of braes. The house is substantial, with every appearance of quiet comfort, with graceful and spreading lime trees and a well-sheltered garden, a pattern of neatness. The steading, close at hand, is compact; and the byre, with accommodation for 29 cows, is commodious, well ventilated, well lighted, and a pattern of cleanliness. In the uplands of Fintry parish, on the estate of the Duke of Montrose, where the farms are wholly pastoral, the steadings at Lurg, Spittalhill, and others are remarkably clean and neat, as well as substantially built, and the farm-houses, though of moderate dimensions, are thoroughly comfortable.

In farm economy thrashing and winnowing machines have long been regarded as essential; but more than two-thirds of the crop, especially wheat and barley, are now prepared for the market by travelling machines. Still, most farm steadings have a thrashing mill, driven by water where that is possible—in other cases by steam or horse power. Mr Simpson, Westmains, Grangemouth, has a thrashing machine with a high-speed drum, driven with six horses, and with this the whole crop has been thrashed during the past twelve years. He finds it useful for giving the horses needful exercise at times when work on the land is impracticable. At Gallamuir Mr Edmond has a machine driven by steam, with which nearly all his crop is thrashed; and steam appears now to be the favourite motive power.

Land is turned over with the common plough, and on some light land there is double furrow ploughing. A good deal of work is done with Tennent's two-horse grubbers, and zigzag iron harrows are used in the carse to break the clods. Twenty-five years ago Stirlingshire took the lead in beginning steam ploughing, but after a trial of five or six years it was found not to pay the company. Some farmers have a feeling against it, and maintain that by going too deep it brought up worthless soil and injured the land. Once or twice since then a set of tackle has been tried in the county, but it has always failed to

pay the projectors. Double-moulded ploughs are used for drilling land and earthing up green crops; and a small one-horse grubber is used for weeding. Dickson's patent harrow is used for turnips before thinning. Hay is cut with mowers, especially those made by Wood, Wallace, and Kemp; and it is collected into windrows with horse rakes. For cutting grain the reapers made by Kemp, Harrison & M'Gregor, and Wallace are used. Hay and corn are conveyed in the common Scotch cart, with wooden harvest frame; and some harvest carts are used, of light make, weighing about 7 cwt. These are very convenient for taking the crop off the land. Implements are used for lifting potatoes; and there are a few turnip-lifters in the county, but they are not in general use.

On the carse near Falkirk the Scotch plough is chiefly used, and in some cases the single furrow wheel plough is used in the autumn and winter, being a very suitable implement for a learner to use. The double-furrow ploughs are discarded, and grubbers are not much used; but the land is ploughed and then broken up with heavy break harrows drawn by three and sometimes four horses. The usual stone and metal rollers are used, and on some farms the Norwegian harrows. Machines are not generally used for sowing grain except beans, which are, in some cases, drilled with a bean harrow every second furrow, or a drill every 20 inches. This allows the horse hoe to pass between the drills, and is considered by some to give the beans more air for podding. Others are of opinion that the preferable way is to sow beans broadcast with the hand. Turnips are thinned with the hand hoe. Hay is generally cut with the combined reaper and mower, but some have a mower for the hay alone. No tedding machines are used, as it is considered best to keep the hay as whole as possible. Grain crops are all cut with reaping machines, except in the case of isolated patches which have got so twisted as to be unmanageable for the machine. In the case of wheat such portions are cut with the sickle, but if barley or oats it is cut with the scythe. No binding machines are used. Beans are cut with the side self-delivering machine, which is thought to be a saving, as the sheaves need not be touched till they are ready for binding: others have them cut with manual-delivery machines, and have the sheaves lifted to one side.

Roads—Fences—Tillage Operations—Succession of Crops—Manures.

Facilities for communication by road, rail, or canal are abundant in all parts of the county. There are about 116 miles of what were turnpike roads, besides others, which are better kept since the Road Act was adopted. Fences vary in different districts. In the carse there are few fences, except sometimes

hedges along the roadsides, and marches between farms, which often consist of a deep ditch. No fences are required, as there is no pasture. Such fences as exist on the arable land in the north and north-west are hedges only; in the east, south, and south-west, hedges, stone dykes, and wood, and wire. Hill grazings are fenced to a considerable extent, and most of the fences recently erected are of wood and wire, but in some cases stone with two wires on the top. The best kept fences in the county are believed to be on the estate of Mr Blackburn, Killearn. Mr Orr Ewing has done a great deal of fencing at Ballikinrain. On the roadsides the fences are stone walls, substantially built, with a coping of hewn stone embedded in lime. On the estates of the Duke of Montrose there are hedges, the gaps being made up with paling. The tenants are bound to maintain the fences on their farms, but they are allowed wood with which to repair them. Fences near Buchanan Castle and on the home farm are good and well kept.

Tillage operations are difficult to manage on the carse. The soil gets very easily wetted, when operations must cease, and if it dries too rapidly it is difficult to get a braird. The drains put in many years ago are beginning to lose their efficacy, and a great deal would require to be re-drained. This partly accounts for the poor production in recent seasons. After a wet spring it is not easy to get the crops sown in time; and much labour is required in breaking clods, which is done with zigzag iron harrows, and rollers of various makes. The usual rotation in the carse is the six-shift, in about equal divisions, consisting of (1) green crop or fallow, (2) wheat, (3) beans, (4) barley, with which grass seeds are sown, (5) hay, and (6) oats. In some cases there is a seventh, called maslin, consisting of oats and beans mixed, and this is highly approved by some good farmers. This crop is seen occasionally on the dryfield soil, but much more frequently on the carse. A modification of this plan is sometimes adopted. Mr Alexander Simpson, who farms Westmains, contiguous to the grounds of Kerse House, at a rent of £2, 10s. per Scotch acre, has for green crop turnips, potatoes sufficient for the requirements of the farm, and tares to be cut green for summer use, but on the remainder he has beans instead of fallow. Abundance of manure is obtainable from Falkirk, Grangemouth, and even from Glasgow by the canal. The best stable dung from Glasgow is delivered at 7s. a ton. With a quantity of this dung applied in the autumn, Mr Simpson finds that a good crop of beans can be reaped from land which would otherwise be unprofitable, and the manure is sufficient to insure that a good crop of wheat will follow. It is considered important that the manure be applied in autumn. About half the quantity will suffice, and it permits that the beans be sown in

drills, giving facilities for weeding, and generally yielding a better crop. In the absence of fallow, it is necessary to have the land in good heart, so that the crop may start freely and keep down the weeds. On Dunmore home farm the rotation is the six-course, without mashlum. About 45 acres can be worked with a pair of horses, which is more than can be done on most carse farms. The whole work on the farm of 380 acres is done by seven pair of horses, except in spring, when there is an additional pair. A good deal of spring work is saved by having the manure spread on the soil and ploughed down in autumn. On the dryfield farm of Gallamuir Mr Edmond has adopted the plan of having the dung spread and ploughed down in autumn, leaving only the artificial manures to be dealt with in spring. This requires some additional capital, as there is always a year's accumulation of dung on hand, but it seems to answer well. The same course is followed by others in the county. The farm of Plean has been occupied by Mr Paterson for about sixteen years. Naturally a good farm, it has been particularly well managed during the present lease, and is now one of the best farms in the county. The farm house is above the average as regards accommodation and general appearance; the steading is well arranged, beautifully kept, and very commodious. The fences are in good order, the land is in rich bearing condition and remarkably clean, and the crops generally are among the earliest and best in the neighbourhood, the turnip crop especially taking the premium not unfrequently at the show of the Stirling Agricultural Society. The live stock of the farm includes a small but superior herd of shorthorns, which occupy a conspicuous place at local shows. It is wholly a dryfield farm, adjoins the farm of Gallamuir, also entirely dryfield, and the two are managed much in the same way, and are good specimens of dryfield farming in the district. On dryfield land the five and six course rotations are the most common, with two or three years of grass, and in some instances an additional year. In the eastern district many tenants crop as they see fit, provided the land is kept in good order, but leases generally bind them to the six-course for carse land, and five, six, or seven for dryfield.

The chief fertiliser is farm-yard manure, a supply of which can be obtained from the towns and villages, as well as from Glasgow. Stable and cow dung is bought in the towns and villages at 6s. 6d. a ton; and the best Glasgow stable manure is delivered at railway stations east of Stirling at 7s. a ton. Mr Paterson, Plean, will use 400 to 500 tons a year of stable manure, and Mr Edmond, on the adjoining farm of Gallamuir, 200 to 300 tons. In the west of the county the cost of carriage from Glasgow is much higher, though the distance is shorter.

Mr Dykes, Blairnavid, near Drymen, has a farm of 257 acres nearly all arable, on which are grown yearly 10 to 15 acres of potatoes, for which Glasgow manure is used. The cost at Drymen station is 8s. 4d. a ton, which is 1s. 4d. more than at Grangemouth, and as much as at Glamis, beyond Perth. Little artificial manure is laid on carse land. Lime and bones are applied to a limited extent. Mr Simpson, Westmains, has lost faith in artificial manures except nitrate of soda, which is applied as a top-dressing to oats and grass with good results. On dryfield farms there are applied to turnips Peruvian guano and dissolved bones, in addition to farm-yard manure. Special manures are used occasionally for potatoes, wheat, and barley, and nitrate of soda is used for top-dressing oats and hay. These fertilisers are sometimes used at a cost equal to one-third or three-fourths of the rent. Feeding stuffs are used on dryfield farms to the value of one-half or three-fourths of the rent, but on small and grazing farms the quantity is less.

A good many farms are worked on the dairy system, especially near towns, and in the south and south-west of the county, and also along the lines of railway, by which the produce can be sent to the neighbouring towns and to Glasgow. In the towns throughout the county, milk is supplied direct to the consumer at 1s. 4d. a gallon, in some cases a little less; to middlemen it is sold at 6d. to 1s. a gallon. In Stirling, milk is sold for 10d. to 1s. 4d. a gallon, butter 1s. 3d. a pound; in the west of the county less is obtained. In the eastern division of the county most of the farms on the high grounds are dairy farms, and there are dairymen also in the small towns. The milk and butter are chiefly consumed in the district, the milk being sold half direct to the consumer and half to middlemen, at an average price of 10d. a gallon. In the mining districts there is a good demand for dairy produce. West from Port of Menteith dairy farming is almost universal, and the milk is carried to Glasgow by railway for three farthings a gallon. Cheese-making in the Ayrshire fashion is conducted by Mr Fleming at Lower Ballaird, near Buchlyvie, and Mr Archibald at Gartfieran, near Loch Lomond. Mr Fleming has a farm of 304 acres situated well down toward the bottom of the valley. It is mostly cultivated in the seven-shift rotation—oats, green crop, oats, hay, and three years in pasture. The grass is cut the first year, made into hay and sold. At first Mr Fleming had it pastured with sheep the first year, but found this unprofitable and not beneficial to the pasture. No restriction is placed on the selling of hay in the district, and on some farms a good part of the rent is made up in this way. Some farmers top-dress the hay with nitrate of soda, but Mr Fleming objects to this, as the hay is not so good in quality, and the pasture is not improved. Mr Fleming has

an excellent stock of Ayrshires, and a well-managed farm, which he has greatly improved, and one of the most airy, comfortable byres in the district. He has four pairs of horses in spring, besides one for the milk-van, and he breeds some good Clydesdales. Cheese-making is prosecuted only in the height of summer. In the early part of the season calves are reared, and milk is sent to Glasgow, but the arrangement with the milk merchant is that the delivery of milk may cease on a short notice given by either party. No butter is made on the farm except from the light cream that collects on the whey, and the cream taken from milk used in the house and on the farm, where the working men have an allowance of skimmed milk. In winter the cows giving milk get cooked turnips, with steamed chaff and meal three times a day; the others get turnips and straw. Pigs are a suitable accompaniment where there is cheese-making, and Mr Fleming has the whey conveyed in a pipe from the cheese room to the piggery. Mr Archibald, Gartfieran, has 37 pure Ayrshire cows. Every season he rears about 20 calves, which pay very well. The calves get warm milk till about the 24th of May, when they are turned out to the grass, after which they get cake mixed with water once a day, and also salt and water, which they like, and which is very beneficial. They come in as young cows at three years old, but, if kept well, a year earlier. From the 24th of May cheese-making progresses till autumn, when the milk is sent to Glasgow. The whole dairy work of the farm is managed by Mr Archibald's own family, which is found to be a necessity, as efficient servants can hardly be got. He has diminished the cropping of the farm, as grazing pays so much better. Wages in the district are high. First men have £17 in the half year, second and third hands less, with meal, milk, and a free house and garden. Outworkers have 1s. 6d. a day, extra hands in times of pressure get 2s. and even 2s. 6d. At hay-making they get 2s. 6d., and in harvest 3s. 4d. to 3s. 6d.

Mr Dykes, Blairnavid, Drymen, has a farm of 257 acres, wholly arable, rented at £1, 8s. an acre. He has twenty-one good Ayrshire cows, and sends milk to Glasgow, and has about a dozen medals, gained at different times, for Ayrshires in the parish of Old Monkland. He has a comfortable house and a neat, well-kept steading. He has four horses and a pony, and grows potatoes and turnips, for which he uses farm-yard manure and dissolved bones, but less artificial manure than formerly for potatoes, as the crop has become uncertain. Turnip lifting is let by contract, at the rate of 7s. the imperial acre. Potatoes are lifted in the same way, at the rate of 45s. to 50s. an acre. The potato crop is regarded as a great difficulty by the farmers. It has been the means of raising rents, and now is very precarious and not so profitable as it once was.

Mr M'Adam, Blairoer, Drymen parish, occupies his own land, 167 acres in extent, and nearly all arable. The rotation is oats, green crop, oats with grass seed, and three years in pasture. The land is well drained, but in a few years the tiles get choked with a kind of ferruginous ore, so that a good deal of renewing is required every time the land is broken up. In a park near the house are some good Leicester sheep, originally from the flocks of Oldhamstocks and Mr Smith, Castlehill. The pasture is excellent, the shelter good, and the sheep have a thriving look. At a little distance is a flock of Cheviots, which also do well. The principal feature, however, is the fine herd of Ayrshires, bred by Mr M'Adam and his father, who took prizes at the earliest Drymen shows. Mr M'Adam himself has often acted as a judge of Clydesdale horses and Ayrshire cows at local shows, and at meetings of the Highland and Agricultural Society. The number of cows is twenty-nine, including some finely-bred animals. The milk is sent to Glasgow, and the prices are, from May to July inclusive, 6d. a gallon; August, 7d.; September, 8d.; October, 9d.; November, 9d.; December, 10d.; January, 11d.; February, 10d.; March, 9d.; and April, 8d. The carriage costs, as at all stations west from Port of Menteith, three farthings a gallon. Mr M'Adam is in the habit of using Glasgow manure, at the rate of about 200 tons a year, and the cost at Drymen station is 8s. 2d. a ton.

Grain Crops—Root Crops—Pastures—Meadows.

On carse land the principal crops are wheat and beans. In 1882 there were 2786 acres of wheat, and in the ordinary rotation it follows the green crop and fallow. On the fallow break it is sown early in autumn, and on other land as soon as it can be ploughed after the potatoes and turnips have been removed. In a good season the yield will be 10 bolls per Scotch acre; in an average season, 7 to 8 bolls; the weight 60 to 63, and occasionally 65 lbs. a bushel.

Beans were grown in 1882 to the extent of 3389 acres. The crop is a profitable one in a good season, and the yield is about equal to that of wheat; but in some recent bad seasons the produce would scarcely be more than the seed. The beans are sown either broadcast or in drills. The latter mode effects a saving of seed, and affords facilities for weeding with hand or horse hoe.

Barley and bere in 1882 covered 4846 acres. The chevalier variety is sown upon light soils; but on stronger soils or more ungenial districts the common varieties are sown, and frequently yield a better return. The average yield of barley is 36 to 42 bushels an acre, but sometimes more in a good season. The

weight varies from 52 to 57 lbs. a bushel, and the quality in the eastern districts is generally good.

Oats cover a larger area than all other kinds of grain together; and in 1882 there were 20,345 acres, which is nearly twice the extent of all the others. On good early land the potato oat is grown; in later or more uncertain districts the sandy, the Barbauchlaw, the Providence, and other varieties are grown. Blainslie oats are grown on the carse; on dryfield land potato or sandy oats. The yield on dryfield soil will be 30 to 40 bushels per imperial acre, weight about 40 lbs. Rye and peas are not grown to any great extent.

Turnips are grown more or less extensively on all arable farms; and in 1882 there were in the county 4589 acres of turnips and swedes. On carse lands turnips form the principal green crop, as few potatoes are grown. The favourite varieties are improved swedes, green top and Aberdeen yellows, and purple top yellows, with a few whites for early use. Swedes are found to be the most profitable when the land is good and well manured. Some of the best farmers apply farm-yard manure in autumn, and add to their own manure a good quantity purchased from the towns. The additional manures applied when sowing are at the rate of 6 to 9 cwt. an acre on dryfield land, and comprise generally a mixture of dissolved bones, superphosphate, potash, also bone meal, guano, and sometimes nitrate of soda. The yield varies from 16 to 24 tons an imperial acre, but in some cases heavier weights are reached. In 1880 Mr Edmond, Gallamuir, got the first premium at the Stirlingshire Agricultural show, with a weight of 30 tons an acre; and in 1881 Mr Paterson, Plean, got the prize, with 26 tons. On the carse turnips require a showery season to get started in time. They do not often yield a bulky crop on the carse, but they are solid and of good nourishing quality.

Potatoes and turnips are grown in about equal quantities on the break devoted to green crop on dryfield land from Stirling to Falkirk; and the yield of potatoes will be 4 to 8 tons per imperial acre. In the district of Slamannan the proportion will be about one-third of potatoes and two-thirds of turnips. In the districts of Kilsyth and Campsie potatoes are in the ascendant. In all the western districts potatoes are grown to a considerable extent, and a ready market is found in Glasgow. In 1882 there were 4066 acres under this crop.

In the carse of Falkirk the mode of operation is somewhat as follows:—Wheat is sown generally in October and November, but on fallow it is sown sometimes in the end of September. The kind of wheat chiefly sown is woolly-eared. When wheat is sown after beans, the land gets a dusting of lime on the stubble to kill the slugs, then a thin furrow, after which it is

ploughed somewhat deeply, and then sown. This practice is adopted on some farms where dung can be readily obtained, and it is considered a safe plan, as not much reliance can be placed on the turnip crop where the land is heavy and stiff. From two to two and a half bushels of wheat are sown with the hands on a Scotch acre of fallow; as the season advances the quantity of seed is increased up to four bushels an acre. The seed wheat is dressed with bluestone at the rate of one pound to four bushels, which prevents ball, and hardens the seed. After the wheat crop has been removed, the stubble is dunged for beans at the rate of twenty to twenty-five tons to the acre. Turnips are generally dunged in the drill; ninety square yards of police dung is allowed to the acre when no artificial manure is added. Hay is top-dressed with from ¾ to 1½ cwt. of nitrate of soda to the acre, sown at two times, allowing an interval of two weeks. Oats are similarly treated. Friesland oats are grown on many farms, a very prolific sort, weighing 38 to 41 lbs. a bushel, and yielding a good proportion of meal. Where land is very rough, bare fallow becomes necessary; but in many instances wheat is superior after a green crop, being stiffer in the straw, and not so liable to get lodged. Wheat after fallow sometimes gets thrown out with frost in spring, in which case it does not ripen regularly, and affords a poor and thin sample of grain.

Cattle—Horses—Sheep.

Since the Earl of Dunmore's herd was dispersed there has been no first-class breed of shorthorned cattle in the county; but there are still some very fair specimens, among which may be noted those of Colonel Murray of Polmaise; Mr Paterson, Plean; Mr Buchanan, Whitehouse; Mr Mackenzie, Northfield; Mr Malcolm, Dunmore home farm; Mr Sim, Mains of Powfowlis; and Mr Christie, Bankend. But although breeders of cattle are few, there are some successful exhibitors, who have successfully studied the physiology of nutrition, and know how to manage cattle. They have had materials analysed with a view to ascertain their adaptation to the feeding and fattening of cattle; and, besides the natural products of the soil, such as grass, turnips, and straw, auxiliaries such as cake, corn, and potatoes, have been added to facilitate the production of good beef. In the carse, cattle are bought in autumn, and wintered on bean chaff with a little cake, after which they are sold for grazing if not fit for the butcher. Of the cattle thus purchased and fed some are shorthorns, but generally they are of cross breeds. On dryfield farms the custom is to obtain at the autumn markets a supply of cattle, those for feeding at the earlier, and those for wintering at the later markets. The feeding cattle get

turnips uncut, with oilcake, and sometimes bruised grain; at first generally 4 to 5 lbs. a day, but for the last two months 6 to 9 lbs. The feeding cattle are sold from Christmas till April, and are generally cleared out by the 1st of May. The cattle that have been wintered are put on to grass and fed during summer. Those fed on rich pastures like the Dunmore policies are fattened on grass alone; those pastured on ordinary grass have 4 to 6 lbs. of oilcake daily.

The county excels in Ayrshire cows. In 1882 there were 10,081 cows and heifers in milk or in calf, most of which were pure Ayrshires. The dairy system prevails on all the higher grounds, and in the valley of the Forth it continues to increase toward the west, till beyond Buchlyvie there is nothing but dairy stock. At agricultural shows from Denny and Dunipace westward, Ayrshire cows take the lead, and at Drymen show there is no other breed exhibited. At most of the dairy farms a proportion of calves are reared; and in 1882 there were 9804 cattle under two years of age. Mr William Weir, Inches, Larbert; Mr John M'Kean, Strathblane, and others, have taken premiums at shows of the Highland and Agricultural Society. Mr Dykes, Blairnavid, has about a dozen medals taken at different times for Ayrshires. Mr M'Adam of Blairoer has an old established and most excellent herd. Mr Archibald, Gartfieran, and Mr Hugh Fleming, Lower Ballaird, are from Ayrshire, and know well how to breed animals with the finest qualities. Mr Duncan Keir, Buchlyvie, is likewise a successful breeder.

Horses are bred in all parts of the county, chiefly Clydesdales, generally of excellent quality, and a few roadsters. The number of unbroken horses, and mares kept solely for breeding purposes in 1882, was 1561,—about one-third the number of horses in the county kept solely for agricultural work. Breeding is prosecuted chiefly in the west, but is not confined to that locality. Mr Simpson, West Mains, Grangemouth, is a successful breeder of horses. He has three to four pairs of superior Clydesdales; and in 1883 his mares produced four foals. Two of the dams were young brown mares, a "Darnley" and a "Gold Dust;" and their foals, by Corsewall, are very promising. In the same season Mr Simpson took the first prize at the Falkirk show with a foal from an aged mare bred on the farm, which has always been a good breeder, and all her progeny have been first prize-takers. The mares on the farm are descended from some of the best sires of the day, including "Topsman," "Black Prince," "Prince George," "Gold Dust," Corsewall," and "Darnley." Two of them had foals in 1883, which are very promising. "Kate," a "Topsman" mare, took the prize given by the Highland and Agricultural Society at Falkirk in 1880. Mr Simpson has gained six cups at Linlithgow for the best pair bred by exhibitor, and not under three years old.

On Inveravon farm Mr John Best has two brood mares, with stock by "Rosebery." On Mumrills farm, tenanted by Mr Robert Calder, are some fine animals descended from "Old Times," "Time o' Day," and "Darnley." The amount of attention given to breeding horses in the district maintains a healthful rivalry at local shows, where the competition is often very spirited.

There are a few flocks of Leicester sheep in the county, among which may be mentioned those of Mr Fleming, Carmuirs; Mr Learmonth, Parkhall; Mrs Reid, Waulkmilton; and, in the western district, Mr M'Adam of Blairoer; but the great bulk of the sheep are blackfaced. Stirlingshire is not conspicuous as a sheep county, the total number of sheep of all ages in 1882 being only 111,658, which is less than the average of Scottish counties, and about 50,000 less than the small county of Selkirk, but there are many flocks of good blackfaced sheep. Among the principal breeders are Mr Buchanan, Killearn; Mr Foyer, Knowehead, Campsie; Mr Coubrough, Blairtummoch; and Mr Orr Ewing of Ballikinrain On the lower ranges of hills Leicester rams are used with blackfaced ewes, in which case the lambs are fed for the butcher; but on the higher ranges the stock is purely blackfaced. Mr Orr Ewing, M.P., has a flock of blackfaced sheep at Ballikinrain, and another on Ben Lomond, the grazings of which are rented from the Duke of Montrose. They are principally breeding ewes. Leicester rams are used with old ewes in the parks at Ballikinrain, and a crop of cross lambs taken, which are fed and sold to the butcher. On the hills the flocks are pure blackfaced sheep, the tups also being blackfaced. These are put among the ewes at Martinmas and separated about the New Year, after which the tups are fed in the parks on turnips and hay. The lambing season begins about the second week of April in the parks, about a week later on the Killearn and Campsie hills, and about a fortnight afterwards on Ben Lomond. Ewes are clipped about the first week of July, and there are about five to six fleeces to the stone of wool. Some of the lambs reared in the parks are fit for the butcher about the middle of July, and they are sent away gradually as they come forward. The bulk of the lambs are separated from the ewes about the middle of August. The sheep get no feeding in winter except in cases when food is unusually scarce, and the death-rate is not high. In general the death-rate has diminished in the county, with the extension of draining. Among the Fintry Hills Mr Cowan, Lurg, has about 1000 blackfaced sheep. Leicester tups are used; and the lambs are sold for grazing or to the butcher. They are sent away in the first week of August onward till the end of the month, and all are cleared off by the 1st of September.

On the neighbouring farm of Spittalhill, occupied by a brother of Mr Cowan, there is a pure and rather famous blackfaced flock. On this farm Mr Cowan and his father before him have been successful in getting good prices for tups, which are purchased regularly by old customers. The spare ewe lambs are also sold for good prices. Mr Alexander Norris, Todholes, adjoining Spittalhill, also on the estate of the Duke of Montrose, conducts operations on the same principle, selling his young tups and his second ewe lambs. Mr Tod, Binns, is one of the most extensive farmers on the Duke's estate, and has a large flock of pure blackfaced sheep. He has extensive meadows, with the hay of which he winters 100 head of cattle, besides about 40 cattle wintered outside. Mr James Cowan, Gartcarron, has Leicester tups and blackfaced ewes. All these hill farmers have Ayrshire cows, though not in large numbers, and winter a few Highland cattle, which graze outside all winter.

Tenure of Land—Capital Required.

Leases generally are for nineteen years, sometimes with breaks at five and seven years; but in some cases a lease of nine years has recently been adopted. In the south and west of the county the term of entry is at Whitsunday; in the north and east at Martinmas. Small holdings are in some cases occupied from year to year. Turnips and straw are not usually allowed to be sold, except in the case of the last crop, when they are offered at valuation to the incoming tenant, and, if not taken by him, can be sold otherwise. All necessary improvements are usually done in the county by the proprietors; and in some cases it is said that proprietors pay one-third of the lime put on carse land during the seventeenth year, and one-half what is put on in the eighteenth year of the lease. On some estates there is a disposition to make leases less restrictive than formerly, and in some instances farmers are allowed to take their own way, provided the land is kept in good order. The capital required for entering an arable farm is £10 to £12 an imperial acre. In the central district the rent of the best carse land is from 50s. to 60s., and in some cases more, an imperial acre; of medium land 30s. to 35s., and of inferior land about 15s. an acre. In the upper districts the rent of the best land is from 30s. to 40s. an imperial acre; of medium 24s., and of inferior 12s. 6d. In the eastern district of the county the rent of best carse land is from 60s. to 80s.; of dryfield, 40s.; of high and inferior land, 10s. to 24s.; and of waste or moor pasture land, about 4s. an acre. Farm rents are in some cases paid in grain according to the fiars prices, but this is chiefly in old leases. Rents of grass parks are very fluctuating. Grazings on the Ochils are let at 8s. to 10s. a sheep, other

hill grazings at 2s. 6d. to 5s. During the past twenty-five years rents have risen 15 to 20 per cent. and upwards, but the rise has been chiefly in grazing and mixed husbandry farms, not so much on the carse. Rents are thought to be too high, but there is no lack of competition for any good farm that becomes vacant. During the recent adverse seasons a good many proprietors have returned 10 to 15 per cent. of the rental.

Peasantry.

There is a good supply of all kinds of labour, and the people are fairly comfortable. The bothy system prevails to a limited extent, but generally the unmarried servants get their food in the kitchen and sleep in a bothy, which is carefully kept clean. There is a good proportion of married ploughmen. Foremen ploughmen get £32 to £38 of money, 6½ bolls of oatmeal, half a gallon of skimmed milk each morning, a free house, coals driven, and two or three bags of potatoes. Ordinary ploughmen have the same perquisites, with £26 to £32 a year in money, with occasionally a small plot of garden ground. As a rule, no hens or pigs are allowed. The engagements are yearly, beginning usually at Martinmas. Single men are engaged by the half year, and have their food in the kitchen, with £9 to £12 in money. Women can be got in abundance from the villages. They get 1s. 6d. a day in summer, and 3s. to 3s. 4d. in harvest. For potato lifting they get 2s. 6d., pulling turnips 2s., and thinning turnips 1s. 6d. a day in summer, but more if the work be pressing. Wages rose in fifteen years from 30 to 40 per cent., but they have fallen about 10 per cent. from the highest point of late years.

In the parish of Airth, the bothy system exists to a very limited extent; and the cottages, which are generally good, are about sufficient to supply labour for the district. The Dunmore estate is well supplied with comfortable cottages. Farm servants are not allowed to keep a cow, but, in addition to gardens, they have 400 yards of potatoes planted. On some farms there is only one cottage, and the rest of the work-people live in the village of Airth, where a good many married labourers live, paying 20s. to 30s. a year for an old cottage and a small garden. In the parishes of Denny and Dunipace farms are generally small, having only one or two pairs of horses. The men servants are generally single, and live in the farm house, but where the farms are larger, the bothy system is adopted. The men prepare their own food and make their beds, but the bothy is cleaned for them. For manual labour, specially in turnip time and harvest, the wives and families of miners are obtained from the villages. In Gargunnock, there are few cottages con-

nected with farms, but accommodation for workers is found in the villages. In this parish the population has diminished, as hand-loom weaving, on which the village depended, has come to an end; but the people who remain have good gardens, for which they pay £2, and more than a dozen of the villagers keep cows. They conjointly rent a park, and get the summer grass for 70s. to 75s. For winter keep they purchase standing oats, which they cut, dressing the oats for their own use, and giving the straw to their cows. The cottages contain two apartments, have generally thatched roofs, with walls in bad repair, floors damp, ceilings low, and the interiors smoky and badly lighted. In Larbert parish many of the people are employed at the Carron iron works, and at collieries. The condition of cottages for farm labourers is fair, with good gardens attached. In St Ninians parish the number of cottages has increased, but the bothy system still prevails to some extent. On some farms the servants get their food in the kitchen, and sleep either in the house or in the bothy. In time of turnip thinning and harvest work, people are got from the neighbouring villages; and some Irish people come from Stirling in harvest, who sleep in barns and other outhouses. In some cases the singling of turnips is done by Irish females and lads, who go down on their knees and thin the turnips with their hands without using a hoe. They are very expert, and can make 2s. 6d. to 3s. 6d. in ten hours, at the rate of 1d. or 1½d. per 100 yards. By working long hours some have been known to earn 5s. and upwards in a day. In Kippen parish the farms are generally small, and a good deal of work is done by the families of the farmers, and young men who board with them. The extra work is done by gangs of Irish, who go out from Stirling and Raploch, take their bedding with them, and sleep in an outhouse. The farmer's family and the servants have their food at the same time, though there is a slight distinction in the viands, especially in the morning and evening. In Kilsyth parish, the cottages are fair both as regards number and accommodation, and have gardens attached. In the town of Kilsyth are feus called "allotments" and "pendicles," which originated in the division of a common by Act of Parliament about eighty years ago. The ownership includes a title to "grass, moss, meadow, and arable land," but the holders are generally poor. The usual hours of work for farm servants in summer are from seven in the morning till six in the evening, with an hour for dinner. In winter the hours are from daylight till dusk, with the like interval of an hour.

Progress in the past Twenty-Five Years.

During the past quarter of a century the county has made great progress in many respects. The population has largely increased. In 1861 it was 91,926, and looking back still further, to 1831, it was only 72,621. In 1871 it had risen to 98,218, and in 1881 it was 112,443. Of this population 64,673 consist of dwellers in towns, 22,141 inhabit villages, and 25,629 reside in rural districts. In Falkirk and its suburbs the increase has been 3887; in Stirling, 1733; in Grangemouth, 1991; in Alva, 865; in Milngavie, 792; and in Kilsyth, 510. There has been a decrease in Denny, Lennoxtown, and to a very small extent in Bannockburn. In the county there are now 251 persons to the square mile. Taking the whole population and area of Scotland, there are 125 persons to the square mile, or 5·1 acre to every person. Twenty-four counties have a more sparse, and eight a more dense population than the county of Stirling. The rental of the county has also very greatly increased. For the year ending with Whitsunday 1856, when the new system of valuation had just come into force, the rental of the county was £370,549, of which £51,534 was in towns and burghs, the remainder in the landward portion of the county; in 1882–83 it was £415,479, exclusive of railways, canals, and tramways, which amounted to £103,870 additional.

There have been improvements in the way of reclaiming waste land, draining, liming, fencing, as well as in the numbers and quality of stock. The most notable instance is at Ballikinrain, in the parish of Killearn. In the year 1862 Mr A. Orr Ewing purchased for £55,000 an estate of 5000 or 6000 acres lying along the hills of Killearn, and sloping down towards the river Endrick. Less than 2000 acres were arable, and the estate was occupied by a number of comparatively small tenants. Mr Orr Ewing took the whole under his own management, and began a process of systematic improvement. The land formerly under tillage was drained to a depth of 3 feet 6 inches, the drains 18 feet apart, and in the smaller drains 2½-inch tiles. The cost of draining was 3s. 9d. to 4s. a rood, making about £8 an acre. The same process was extended to land higher up the hill sides, which had previously been worthless, and covered only with stunted heath. The total extent thus treated was upwards of 2000 acres. The land, having been drained, was all ploughed and subsoiled, chiefly with subsoil grubbers made by Gray of Uddingston. A crop of oats was then taken, and then a second crop, consisting of swedes, purple top, and Aberdeen yellow turnips, sown in drills. Besides farm-yard manure 3 cwt. of dissolved bones were given to each acre. The yield was, in some instances, 35 tons an acre; the average about 25 tons.

The turnips were all carted off. Next year a crop of oats were taken, and the land was sown down with two bushels of rye-grass and 3 lbs. of red, white, and alsyke clover to the acre. Lime, at the rate of 6 tons, and 3 cwt. of crushed bones, were applied and harrowed in with the grain. The oats were Providence, Barbauchlaw, and sandy; and the average yield was 7 bolls an acre. The land was then pastured with sheep, and soil previously worthless would keep four sheep to the acre for the first year.

For fourteen years the land lay in grass, pastured with cattle and sheep. Young cattle get no extra feeding, but those preparing for the butcher get oilcake and Indian corn. About 80 cattle can be pastured on 100 acres for a few years after being well laid down; and 2½ to 3 sheep can be kept on each acre. Sheep in the parks have no extra food, except a little in February and March. About 160 cattle are fed every season. They are grazed in summer, but put into byres in winter, fed with oilcake, Indian corn, and bruised oats, and sold to Glasgow or to local butchers. At present there are 12 pairs of horses, but while the principal improvements were in progress there were 22 pairs. There are twelve steadings of various sizes on the estate. After fourteen years the land is again broken up, and the same process as at first is followed. The yield is equally good after the second process as after the first. The drains are working as well as they did when put in, but in boggy parts or near plantations they have required cleaning.

The sheep are blackfaced, and Leicester rams are used with those in the parks, which are chiefly old ewes, from which a crop of cross-bred lambs are taken, fed off, and sent to the butcher. On the hills the stock consists of pure blackfaced sheep. Rams are put among the ewes at Martinmas, and removed at the New Year, after which they are fed in the parks with turnips and hay. Lambing begins in the parks on the second week of April, on the hills about the 14th of the month, and a fortnight later on Ben Lomond, the grazing of which Mr Orr Ewing rents from the Duke of Montrose for £1100 a year. From this mountain pasture the cast ewes are brought to Ballikinrain parks, thus obviating the necessity to purchase stock.

The new fields at Ballikinrain vary in size from 20 to 100 acres. They are fenced with stone walls, very substantial and well built, and with continuous iron-fencing. The walls are about 5 feet high, with copes of hewn stone embedded in lime. The cost was 33s. to 36s. a rood. The iron-fencing has five bars, four flat and one round, in four yard length hurdles, and the cost was 2s. 10d. to 3s. a yard. The principal steading is a square, of which the south side is occupied partly by the thrashing mill, driven by a powerful steam-engine, and the east side by the stables

for work horses, which are roomy and well-ventilated. The horses themselves are the best class of Clydesdales, well fed and well kept. In the centre of the square, isolated from the other buildings by a paved passage about 12 feet wide, is a large covered court for cattle. The whole steading is supplied with water by gravitation.

For the site of a new mansion Mr Orr Ewing chose a situation high up on the hill side, with a most extensive prospect. Nothing grew on the place but poor heather, the land had to be thoroughly drained, and, in laying out the policies, a great deal had to be done in the way of excavating at some points, and levelling up at others. The cost is said to have been £100,000, but the result is a magnificent mansion, with grounds and gardens in the most superb style. The old mansion still stands in a secluded, sheltered, but rather sunk situation not far from the river Endrick.

Of improvements other than agricultural within the past twenty-five years, a notable example is furnished by Grangemouth. A sum of £600,000 has been expended on docks, and there are now 12 acres of docks and 8 or 9 of basins. One chief feature in the traffic is the extent to which steamers have superseded sailing vessels. The Carron Company have steamers three times a week to and from London, carrying all kinds of goods. Next to them are the Rotterdam steamers, which take out iron and other goods, bringing back vegetables, manganese, and all kinds of produce. Messrs James Currie & Co., Leith, have lately resumed the Hamburg traffic. About 300,000 tons of pig iron are yearly brought from Cleveland, the principal importers being Messrs James Watson & Co., Glasgow. In 1858 the number of vessels entering and leaving the port was 1010. They were 125,000 tons register, and the cargoes were 202,000 tons. In 1882 there were 1616 vessels, 437,000 tons register, and carrying 860,000 tons of cargo. The amount of cargo has therefore increased more than fourfold in twenty-four years. The traffic in 1882 was the highest ever recorded at the port; but it was very closely approached in 1877, after which there was some decline. Grangemouth was made into a burgh of police in 1872, and a water supply was introduced on the 19th of September 1876.

In implements for farm work there have been great improvements within the past twenty-five years; and in this department the county is well represented by the firm of Kemp & Nicholson, agricultural engineers, Stirling. This firm began operations in 1848, and since that time there has been a great development of implement manufacture. A good share of business has been retained by the Stirlingshire makers. In 1860 they began to construct reaping machines; and these implements, with im-

provements suggested by practical experience, have found their way into all the Scottish counties, as well as to the Continent, Australia, and New Zealand. Prizes were awarded for these machines by some district societies in 1860, by the Highland and Agricultural Society at its Perth meeting in 1861, at the International Exhibition in London, 1862, and at the International Exhibitions of Hamburg, Dublin, Stettin, and Cologne, besides many other shows in intervening years. Twenty-five years ago grass and grain were cut laboriously with scythe and reaping-hook, but now cutting with machines worked by horse-power has become almost universal. Great progress has also been made—in which the same firm has acted a conspicuous part—in the making and adapting to special circumstances of horse rakes, harrows, grubbers, land rollers, turnip-sowing machines, drill ploughs, drill grubbers, turnip cutters, sheep fodder racks, and food-cooling barrows.

Other Industries.

In the county of Stirling there is much business activity The Carron Ironworks maintain a position among the foremost of their kind in the country. The first furnace at Carron was blown early in January 1760, when the company consisted of Dr Roebuck, who was manager, with his brothers Thomas and Ebenezer, Samuel Garbett, William Cadell of Cockenzie, William Cadell, junior, and John Cadell. The chief articles of manufacture were cannons, mortars, and chain shot, prepared for the arsenals of Europe, including the British Government, who obtained from Carron the whole battery train used by the Duke of Wellington. The company received a charter of incorporation in 1773, with a capital fixed at £150,000. The works were visited in 1821 by Prince Nicholas, afterwards Emperor of Russia, and subsequently by Prince Leopold and Prince Maximilian of Austria. The Prince of Wales was there in 1859. No carronades or other war castings have been made since 1852; but a great amount of work is done in the smelting of iron and the manufacture of axles, grates, cooking ranges, stoves, boilers, kettles, pots, stewpans, sugar pans, &c. The farm connected with the works, called the Roughlands, with the lands adjacent, extending to 400 acres, is stocked with everything necessary in the way of feeding and fodder for the foundry horses.

The Falkirk Ironworks, also very extensive, were started about sixty years ago by some workmen connected with Carron, but came into the hands of the present proprietors in 1848. The buildings cover 8 acres of ground, and the work-people numbering 900 men and boys, turn out more than 300 tons of

castings a week. They have made such heavy articles as the columns for the Solway viaduct, and castings for some of the principal bridges in India, Italy, and Spain, besides tubular telegraph posts for South America; and a great business is done in making register stoves, hat and umbrella stands, garden seats, verandahs, iron stairs, &c.

Other ironworks on the banks of the canal are Burnbank, Gowanbank, Grahamston, Parkhouse, Camelon, the Union Foundry, the Port Downie, and the Forth and Clyde Ironworks. There are also the Abbots, the Gael, and the Etna Foundries, and, close to the branch of the North British Railway at Grahamston, the Callander and the Vulcan Ironworks. There is also the extensive engineering establishment of Messrs Blackadder.

There are at least thirty-four coal pits in the county, the principal of which are in the districts of Bannockburn, Auchenbowie, Denny, Lennoxtown, Kinnaird, Falkirk, Redding, and Slamannan. The number of men employed is above 1800.

Calico printing is carried on in the west of the county, especially by Messrs R. Dalglish, Falconer, & Co., at Lennox Mill, Campsie. Every description of calico printing is there in operation, from the finest muslin to the coarsest calico worn by the pariahs of India. Lennox Mill contains seven printing cylinders and 200 tables. The water-power is equal to about 20 horses, and the steam-engine is 30 horse-power. The heating and dyeing are all done by steam, and for these purposes about 250 horse-power of steam is employed. About 30 tons of coal are consumed daily. The stock of copper rollers amounts to 1500, and weighs about 155,000 lbs. The works give employment to 545 hands, and 250,000 pieces can be produced annually. There are calico works also at Blanefield, five miles from Campsie to the west.

At Alloa, Stirling, and Bannockburn there is yarn spinning and woollen manufacture. In Alva there are nine spinning mills employed on yarns for making shawls, tartans, and tweeds. About 220 persons are employed. The weaving of shawls, handkerchiefs, plaids, and shirtings is the principal trade of the village, and gives employment to 700 journeymen and 100 apprentices in the busy season, besides 500 or 600 women employed in winding, twisting, and finishing, and a number of boys. In Stirling there are woollen mills; and at Bannockburn are two extensive mills owned by Messrs William Wilson and Sons, one of these includes spinning, dyeing, and the weaving of carpets, tweeds, and tartans, in which fourteen carding machines are employed; in the other, carpets only are manufactured. About 500,000 lbs. of wool are used yearly, and 180 hands are employed.

Manufactories of chemical products are numerous in the county. The works of the Hurlet and Campsie Company were

begun in 1806, for the manufacture of alum, copperas, prussiate of potash, Prussian blue, &c., and the works usually employ over 300 hands.

At Stirling, Denny, and Falkirk there are pyroligneous acid works, in which the distillation from wood is used in making iron liquor for printfields, and also vinegar. The oldest firms employed in this work are those of Messrs William M'Laren and Sons, and Mr James M'Alley, Grahamston. The Lime Wharf Chemical Works were begun in 1845, and are still successfully conducted.

There are paper works in the district of Denny; and at Herbertshire Mill Messrs Wm. Collins, Sons & Co. employ about 100 men and women.

Extensive quarries have been opened in the county since railway communication gave facilities for the conveyance of stone, and building stones have been extensively taken to Glasgow and Edinburgh. The most important quarries are those of Dunmore, Polmaise, and Plean near Bannockburn, where the coal measure sandstone terminates. In 1867 Mr James Gowans, Rockville, Edinburgh, sent from Plean quarry a large quantity of material to be used in building the new warehouse in Paternoster Row, London, for Messrs Nelson and Sons, publishers. About 450 men are employed in the freestone quarries of the county, and their wages are 20s. to 25s. a-week.

Lennoxtown, in the parish of Campsie, is the chief district for limestone, which is worked by Mr Mathew H. Muirhead of Ballyglass, Mr David Wilson of the Glorat Works, and Mr John Kirk of Balgrochan Works, who employ in all about 160 hands. The limestone is of the very finest quality, some of it containing 93 per cent. of carbonate of lime.

As previously mentioned, there are coach works at Stirling, belonging to Mr George Thomson and Mr William Kinross; and Messrs James Robertson & Son and Thomas Hastie have works of a like kind at Falkirk.

There are distilleries at Glenguin in the Blane Valley, Glenfoyle, Gargunnock, Cambus, Bankier, Bonnymuir, Rosebank, and Camelon; and Messrs James Aitken & Company have a brewery at Falkirk.

Shipbuilding is the great industry at Grangemouth, where Messrs Dobson & Charles build vessels of iron and wood from 300 to 1000 tons. Boats for the canal trade are built at Port-Dundas by Mr Gilbert Wilkie, and sails and ropes are made at Grangemouth and Bainsford.

In St Ninians are two leather manufactories, and in Falkirk four, in most of which currying as well as tanning is performed. The average wages are 26s. a week; tanners earn 20s., and tanning labourers, 16s.

Candle-making is carried on by Mr John Rintoul at Falkirk.

Candles are made for mines; but some ordinary candles, both dipped and moulded, are also made. With modern machinery about 8000 dipped candles can be manufactured in a day by a single workman.

On the estate of the Earl of Dunmore, near Airth Road Station, 7 miles by road from Stirling and 6 from Falkirk, is the Dunmore Pottery, which has acquired a good reputation for certain kinds of earthenware.

In 1874 was begun the construction of fish ponds at Howietoun, by Sir James R. Gibson Maitland, Bart., who thereby introduced to the county a new and important species of industry. The various ponds and houses occupy about eleven acres, and are of the most complete and excellent description. To feed the fish in the ponds, three or four horses are killed each week, and a plentiful supply of clams is brought from Newhaven. Instead of the old method of incubating the ova in wooden boxes, the plan has been adopted of incubating on tubular glass grills; and from eight to ten millions of ova can be hatched every year. The hatching houses, ponds, and arrangements for the despatch of ova or fry are admirable, and the results are so immense that from the Howietoun ponds there might be sent forth sufficient to stock all the rivers and lochs in Scotland. The demands from distant parts of the country are large and increasing; and fry can be sent long distances without difficulty. In one season a consignment of 40,000 eggs of Lochleven trout were carefully packed and forwarded to the Norfolk and Suffolk Acclimatisation Society; and they arrived with only a dozen dead eggs in the whole number. The prices of eggs from Howietoun is about the same as that charged by the German Government, which has given much attention to pisciculture. For year-old and two-year-old trout the prices are about one fourth of those charged on the Continent, and the arrangements for conveying fish are so good that hardly any deaths occur.

APPLICATION OF TOWN SEWAGE IN AGRICULTURE, AND THE EFFECT OF THE HERBAGE ON THE ANIMAL SYSTEM

By James Barr, junior, Whiteshaw, Carluke.

[*Premium—Fifteen Sovereigns.*]

The farm of Whiteshaw is situated in the parish of Carluke, Lanarkshire, and is close to the town of Carluke, in which there is a population of 3790. The farm contains 260 acres, and the soil is very varied in character; in the upper portion of the farm

there is a small outburst of the millstone grit, and also a portion of the limestone formation, on both of which the soil is a fertile clay, suitable for growing fine nutritious crops of hay. A large dyke or throw in the strata brings in the coal measures, and on the other side of this dyke the soil undergoes a complete change to a thin bare clay. The lands have a northern and western exposure, at an elevation rising from 500 to 630 feet above sea-level, some of the fields having a gradual slope suitable for irrigation.

As far back as the year 1862, I had a tank for collecting all the urine of the steading, and a cart for taking the urine out to the fields; after two or three years' experience, however, I found that all the benefit of the application was more than lost by the horse and cart damaging the heavy land in the rainy winter months. So the tank and the cart were abandoned, and the rich dark urine found its way to the nearest ditch, in the company of the drainage of the steading, grumbling, as I now think, at the wasted life to which it was being condemned.

I had included 2 lb. per acre of Timothy seed in my grass mixtures for some years; and having a field in green crop in 1870, I thought I would try the experiment of sowing 20 lb. per acre on about an acre and a-half next the steading, and run the urine and drainage of the steading upon it. I did not want to incur expense till I saw how it might succeed, so it was ploughed along with the rest of the field, the ridges having a slight round on them, which made it not so suitable for irrigation. The application was most successful, the strong vigorous growth in the early spring, the early cut of grass for the dairy stock, and two or three times a year, if it was required, made the meadow so indispensable that it has been allowed to remain in the same state until now. On too many farms the drainage of the steading is allowed to find its way into the nearest ditch, and sometimes even to pollute the drinking water of the family or the cattle; but if the urine, the water from the roofs, and the waste water of every kind, were brought together into one outfall, and run upon the nearest field with a slope for irrigation, farmers would be surprised how richly they would be rewarded.

In the year 1875, the town of Carluke was formed into a drainage district, and the only outfall for a small portion of the district was the ditch in which the urine and drainage from the steading had been allowed to run to waste. At my request, the local authority readily consented to lay the sewage pipes a considerable distance into the field, in which the urine meadow is placed. The quantity of sewage thus obtained is received from a population of about 250. There are fifty houses, none of which have more than three apartments, and there are no water closets, the quality is therefore very weak and diluted; but it is sufficient to manure nearly three acres of meadow land, and

if allowed to run too long upon one place, the crop becomes too heavy and lodges. The only obstacle is, that a constant and sufficient quantity is not received, and in the dry spring months of the year, when the greatest benefit would be got, the supply is nearly dried up. The mode of application is a very simple one:—As there is not a sufficient volume of sewage to carry out what is known as catch work, shallow ditches are cut out with the spade here and there over the land, where they are seen to be required; the sewage is run in these ditches and spreads itself over the land, its course being changed once a week; the cost of all this is very small, the work being done by a labourer on the farm at odd times, but if a correct account was taken the outlay would not exceed 5s. per acre. When the grass is cut early in spring for the cattle, the sewage is run upon the land after being cut; but when it is allowed to mature for hay, the sewage is kept running through the crop till within two or three weeks of cutting, when it is run off by a side ditch.

The field was in green crop the previous year, and without incurring any expense in preparing it for irrigation, the land was sown down to grass with an oat crop, the grass mixture including 16 lbs. of Timothy per acre. There were also sown smaller quantities of the best natural grasses—the Fescues, the Poas, Meadow Foxtail, and Crested Dogstail, from 1 to 3 lbs. of each; my usual practice being to include all these in my grass mixture, along with Italian and perennial rye-grass. The Italian dies out after the first year, the rye-grass after the second or third year, their place being taken up by the slower growing natural grasses, and a rich close sward formed. But for our soil and climate, Timothy should form the larger part of any grass mixture for a meadow, for irrigation, or for continuous cutting. It is strong in the straw, does not lodge readily, and is not easily injured by the weather. Horses and cattle are all fond of it, and I have often observed the coats of the horses turn glossy and sleek when fed upon it. To discard Italian and perennial rye-grass from our grass mixtures, as some agriculturists propose, would be a mistake which would soon rectify itself. They are in their own time and place most valuable, but when these alone, with the clovers, are sown, it is no wonder that the land gets covered with fog. When, in a year or two, the rye-grasses die out, and there are no natural grasses to take their place, the fog speedily does so; then the land is said not to graze well, and has to be ploughed, and is sown over again with the old rye-grass and clover mixture, to be followed as quickly by the fog. No crop of the farm has hitherto received less attention than the grasses, yet of all the crops it is the one which is capable of yielding the most delight, and, when care, and skill, and money, are judiciously spent upon it, it is of all others the most profitable.

The value of a crop is not always to be measured by the bulk of it, and success in farming, beyond all the other professions, is often gained by doing things at the nick of time. So, when the east wind blows far into the month of May, and the turnip crop is eaten up, and the face of the country is brown and bare, then it is that for green cutting, the sewage meadow comes in worth something far beyond its own value for a dairy stock, and it is scarcely possible to put a price per acre on such a resource to fall back upon. In some years, however, nearly the whole of the crop is allowed to mature for hay, and when grown as hay the crop has never been less than 4 tons per acre. When handled quickly, and secured in good condition, the quality is fine green sweet Timothy, and is relished by both horses and cattle. If sold off the farm, taking one year with another, the value would be not less than £12 per acre, and some years would run up to £15 to £16; and all these sums are inside the value.

After an experience of six years, I have never observed any injurious effect from using sewage grass upon any animal on the farm. The grass has been cut green from the early spring, and at other times all through the summer, and supplied to the cattle, but in this green state it has rarely been given, and then sparingly, to the horses. It has always, however, been given along with other food, and I should not like to incur the risk of feeding any breeding stock exclusively upon grass grown with sewage, or to permit them to graze upon it; but when it is allowed to mature, and when made into hay, I have no hesitation in supplying it in any quantity to every animal on the farm, and practically this has been done for the last six years.

Separated by two fields from my own meadow, but on a considerably lower level, is a field of 13 acres on Kirkton estate. It is leased by Mr Pinkerton, butcher, Carluke, and when he entered, it was poor, bare land. It has, however, a fine fall for irrigation, but was otherwise in a rough uneven state. When Carluke drainage district was formed in 1875, it was found that about 10 acres of this field was on a level to receive the sewage from nearly one-third of the town, being a population of 1400 to 1500 inhabitants. One half of the field was allowed to lie in the state it then was, the other half was ploughed out of the lea and sown with oats, and along with the oat crop was sown a grass mixture of all the best natural grasses recommended by myself, in addition to 2 bushels of rye-grass. On the removal of the oat crop, the sewage was run upon the whole 10 acres, and the land, which was fully rented at £2 per acre, rapidly increased in value, and is now worth £4 per acre. Considerable expense, equal to about a year's rent of the field, was incurred in erecting a large wooden conduit and cutting a deep drain, and laying with 12-inch glazed pipes, to convey the sewage to the centre of the field, but with this exception, the sewage is con-

ducted over the field in shallow ditches, in the same manner as upon my own meadow, and at an annual cost not exceeding 5s. per acre. The quality of this sewage is fatter and of more value than mine is; it is also received in much greater volume, and is not so difficult to manage; and the quantity of sewage received upon this field is sufficient to manure from 5 to 10 acres more land. The produce has not been matured for hay, but is grazed by cattle and sheep to accommodate Mr Pinkerton's business as a butcher. The animals have access to water in a burn running at the bottom of the field, but they have also free access to the sewage water. Here then we have a valuable opportunity of testing the effect upon the animal system of herbage grown with sewage, and of drinking sewage water; and the answer is at once complete and unmistakable. Mr Pinkerton, in carrying out his business, buys cattle and sheep, grazing them for a week or two, as he may require, on the sewage meadow; but when any animal was kept over from six to eight weeks it began to lose condition, and to look unhealthy; liver rot set in, to be followed ere long by death. This is not now allowed to take place, for the animals are either slaughtered in proper time, or sent to a change of pasture, to prevent what is now known to be certain loss. For horses, cattle, and sheep, the land as grazing land has been proved to be both unhealthy and deadly; but as the sewage runs upon some part of the land all the year round, it is impossible to say how much of this is due to drinking the sewage water, or to eating the herbage.

My own sewage meadow is about 150 yards from the steading, and we have never felt any offensive odour, nor have any complaints been made of Mr Pinkerton's meadow; and in walking regularly over the ground myself, I have never seen anything, or felt any smell, likely to injure the health of either man or beast; and I would gladly receive upon my own farm any quantity of town sewage.

Though with our clay soil and retentive clay subsoil, it is unsafe as grazing land, it has not been found to be so in every instance. It gives me much pleasure to record the larger experience of another experimenter, in which he says :—

"We have sheep-grazing on irrigated meadow during the winter months, which always thrive well and fast.

"I never knew of a sheep drinking sewage water.

"Stall-fed cows do well on irrigated grass, both milk well and also feed well.

"Our own horses are very fond of it; but great care must be exercised in giving soft grass to work horses. Our waterman has watered the meadows for about thirty years, and is always well. I have been amongst sewage irrigation all my life, and it has not had any bad effect on me."

Should ensilage become a success in this country, a new mode

of dealing with the produce of sewage meadows will be opened up, which may greatly enhance their value; but at the present time I am well satisfied with the results as carried out upon my own farm, having found it to be both successful and safe.

This report may have comparatively little bearing on the great body of farmers, for few farms have any opportunity of receiving town sewage; but the number of farms suitable for irrigation is very large. My experience of the value of the sewage which can be collected about a farm itself, leads me in my journeys through the country to observe how much is going to waste, and this may be the means of drawing the attention of some of my brother farmers to the subject, and no one who has not had practical experience of it can form any idea of the value about a farm of even one acre of such land.

THE OLD AND REMARKABLE HORSE CHESTNUT TREES IN SCOTLAND.

By Robert Hutchison of Carlowrie.

[*Premium—Five Sovereigns.*]

The horse chestnut (*Æsculus Hippocastanum*) does not appear to have ever been largely cultivated as a timber tree in Scotland. Probably, from the brittle nature of its wood, it has never attained a front rank among the hardwooded trees suitable to the Scottish climate, as a valuable timber-producing tree for economic purposes. But whether this be the reason or not, the fact remains that our old friend Professor Walker, in his Catalogue of Remarkable Trees in Scotland, only cites four specimens of the horse chestnut, namely, at "Bargaly, in Galloway," at "Hatton in Mid-Lothian," and two trees of the species at "New Posso, in Tweeddale," which he says, writing in 1780, are probably the oldest and the largest in North Britain, and that they were then known to be about 150 years old. Dr Walker in his memoir further states, that "the planting of the horse chestnut in Britain," in his day, was not "of a very old date." Reference will be further made to these two individual trees at New Posso, or as it is now called Dalwick, in this chapter, which Dr Walker in 1780, and subsequently Gilpin, and Sir T. Dick Lauder in 1826, considered the oldest, largest, and finest in Scotland at the time they wrote. The measurements given by Dr Walker of the only four trees he quotes, being only from 6 feet 10 inches at 4 feet from the ground for the smallest, to 11 feet 4 inches for the largest, show conclusively that in his day the horse chestnut had not been held in much esteem for extensive planting in Scotland during the early years of its introduction from its native habitats into Great Britain.

The horse chestnut appears to have been introduced into Europe from the northern parts of Asia about the year 1550; and the earliest notice of its appearance in England occurs in Gerard's *Herbal*, where in 1579 he speaks of it as a rare tree. When first introduced it was planted with walnuts and mulberries as a fruit tree, and it is curiously enough described as "a tree whose fruit was of a sweet taste, roasted and eaten as the ordinary sort," and shows how little was really then known of it or its fruit. Evelyn, who wrote in 1663, referring to the slow progress the tree had made in popular estimation even at that date, says of it:—"In the meantime, I wish we did more universally propagate the horse chestnut, which, being increased from layers, grows into a goodly standard, and bears a glorious flower, even in our cold country. This tree is now (1663) all the *mode* for the avenues to their country palaces in France, as appears by the late superintendent's plantation at Vaux." A branch of the horse chestnut with flowers on it was received by Clusius from Vienna in 1603. Singularly, even he had never seen it till that time, and gave the first figure of it in 1605. It was not known in Paris till 1616, and was probably first planted generally in Britain about that time, or soon afterwards.

According to the authority of Dr Heldreich, director of the Botanic Gardens at Athens, the horse chestnut is undoubtedly found wild, and indigenous to the mountains of northern Greece, Thessally, and Epirus. He states that he has seen numerous groups of trees in various localities in the mountains of Eurytania. In the summer of 1879, he found it in five different localities, all of them in the lower pine region, at altitudes varying from 3000 to 4000 feet above sea-level. In such sites it occurs in shady forest ravines, and is associated with the alder, walnut, plane, ash, oaks of various varieties, holly, hornbeam, sycamore, and *Abies apollinis*. It is very probable that the earliest introduction of the horse chestnut into Britain was from the districts along the shores and maritime ports of the Levant, and that its introduction was coeval with that of the laurel to English gardens from the same sources.

According to Evelyn, the name horse chestnut was given it from a belief in its supposed medicinal property of curing broken-winded horses and other cattle of cough; but other old authors assert that it was so called from the peculiar appearance presented by the base of the young leaf-stalks on being cut across in a slanting direction, between the joints of the former year's growth, when an exact representation of the frog and sole of the hoof of a horse is seen. The generic name is of course derived from "*Esca*," signifying food. One enthusiastic admirer of trees in general, and of this species in particular, exclaims —"How can this tree fail to be otherwise than a much-admired favourite, for its very name is designated by a combination of

three words signifying separately, a noble animal, an elegant game, and a delicious kernel!"

Before noticing some of the more remarkable trees, of which details of their measurements and localities are accurately given in the appendix to this chapter, it may be proper to state generally some of the more characteristic features of the horse chestnut, and of its suitability for various soils and situations, and glance briefly at its economic or commercial value as a timber-producing tree in this country.

The first noticeable feature in the progress and growth of the horse chestnut is its early budding in spring in our northern latitude. Each short stout twig being soon surmounted by its terminal bud in early spring, which swells and strives with active energy to outstrip its lateral fellows in throwing off its wintry scales and coating—like a youth at school defiant of his winter top-coat—even so in like manner, imprudent of future chilly and severe weather, does the horse chestnut cast off its gummy cell and envelope at Nature's call, as the increasing warmth of the sun's rays begins to melt away the gum with which the outer scales had been sealed together, thereby causing the expanding pressure from within to unfold the delicate young leaves and embryo spiral flower stalks. The horse chestnut, while not fastidious as to soil, succeeds best and grows most rapidly in a rich loam, with a cool subsoil rather damp. That it is a tree of rapid formation of wood may be inferred from the fact, that when it has attained twenty years of age, it is frequently met with from twenty-five to thirty feet in height, and at that age its entire length of annual growth is generally completed for the season within a month from the bursting of the bud in spring on the terminal shoot; ample time is thus afforded for the mature ripening of the season's growth, and for the formation of the young shoot bud-sheaths for protection from winter; the summer and autumn nutriment of the tree going entirely to the thickening of branches, and development of woody fibre in the trunk and limbs. From this peculiarity, however, the timber of the horse chestnut is soft and brittle, and of little commercial value for manufacturing or constructive purposes. The principal uses for which its wood can be most advantageously employed, are for water pipes to be kept constantly under ground, for which it is very suitable, or in the manufacture of packing cases, for which it is in large demand in many shipping ports and industrial centres of export fabrics on the Continent. In this country the horse chestnut can hardly be regarded as other than an ornamental park tree, and as such it is perhaps unrivalled for symmetry and effect when planted singly, or in the formation of a straight avenue line. Noble examples of horse chestnut avenues exist, and are referred to in the appendix. Who has not heard of the famous avenues of

Bushey Park near London, which, when in full flower, it is well worth any lover of trees going a day's journey to see and admire? In our northern latitude, also, we find many umbrageous stately avenues of this beautiful and graceful tree. For example, at Drummond Castle, Perthshire, along the roadside towards Crieff, one of the finest avenues is to be seen. It is perfectly vigorous, and presents one continuous beautifully arched aisle for several miles. For a considerable distance, well proportioned beeches of majestic growth, guard, sentinel-like, the highway, planted about 20 feet apart; then for another stretch, tall healthy overarching lime trees take up the line, till the horse chestnuts prevail and continue the beauty of the scene, vying successfully with the other lines in adding pleasing and picturesque effect to the landscape, while their grateful shade is most refreshing to the pedestrian. These trees are all of large dimensions; many of them girth from 11 to 13 feet at 5 feet from the ground, and are from 60 to 70 feet in height. Another mixed avenue of horse chestnuts and limes may be seen within the Drummond Castle Park, and is of commanding growth and beauty. The soil is a light loam upon the trap-rock formation, which crops out in many places on the surface in the park.

At Gilmerton, East Lothian, there is a fine avenue of horse chestnuts, which average 72 feet in height, and present noble boles from 18 to 25 feet in length, while their circumferences vary from 10 feet 2 inches to 11 feet 5 inches at 5 feet from the ground. The soil is a heavy clay loam upon a tilly clay subsoil. Other avenues worthy of notice, in various districts, might be named from the notes furnished by correspondents in various parts of Scotland; but we need not lengthen out this chapter with needless repetition of evidence to inculcate the fact well known to every tree-lover, that in rich loamy free soil, in sheltered situations, avenues formed of the horse chestnut will amply repay their owners, in richness of shade, and gorgeous effect when in flower, for their beautiful minaret-like spikelets rising tier above tier of handsome blossom, form not the least conspicuous features in a well-formed avenue of this very suitable tree. The finest horse chestnuts in the southern counties of England are said to be at Mount Edgecombe in Devonshire, but details of the growth and dimensions of the individual trees composing it have not yet been received.

It would appear that if planted as an avenue tree, the horse chestnut should be used alone in its formation, for it is impatient of other species near to it; and at the approach to the Wimborne Cemetery, Dorsetshire, a striking instance of this occurred lately. About seventeen years ago, an avenue of horse chestnuts was planted. The trees were considered too wide apart (25 feet), and accordingly, about eight years afterwards, an English yew was planted between each. The result of the appropriate

intermingling of the yew trees' gloomy foliage in such a situation has been most unfortunate, for the horse chestnut avenue, previously very thriving, has drooped away in growth every year, and is now rapidly dying out. The cause, whatever it may be, seems fairly attributable to the close proximity of the yews, and probably arises from the roots of the two species having incongruously got into contact.

As a park specimen tree, the horse chestnut is largely employed in Scotland, and in such a position its fine symmetry is well displayed. Perhaps when so planted it requires a more sheltered situation than the sycamore or oak, as it is more easily injured by wind in an open site, and is consequently not so well adapted to resist a stormy gale without suffering more or less damage, which shows more upon the horse chestnut from its beautiful and striking peculiarity in an open situation, of always presenting a regular parabola in its contour of dense umbrageous head. A striking example of this peculiar characteristic is found in a tree, given in the appendix, growing at Kirkconnel House, Dumfriesshire. It stands on the lawn in front of the mansion, near another very fine specimen, although less conspicuous in this special feature, and which is also given in the appendix. The latter girths 11 feet ½ inch at 5 feet above ground, and has a diameter of spread of branches of 72 feet, with a finely balanced head 55 feet in height. The former, which presents from a distance the appearance and outline of a huge mushroom, is 40 feet high, and 9 feet 11 inches at 5 feet from the ground, and has a diameter of spread of branches of 89½ feet. A third fine specimen here, growing in a plantation, and consequently taller, being probably "*drawn up*," is 65 feet high, and girths 10 feet 9½ inches at 5 feet from the ground. In the same district, at Ardwall near Gatehouse, and growing at an altitude of not more than 30 feet, and within 200 yards of the sea, stands a beautiful horse chestnut 75 feet high, girthing 12 feet 2½ inches at 3 feet, and 12 feet 3½ inches at 5 feet above ground. Many other fine specimens of similar dimensions are to be found at St Mary's Isle, Kirkcudbright, and in other localities of Dumfriesshire and the Stewartry, as well as in Wigtownshire and South Ayrshire. In the last mentioned county, several notable specimens occur, and are given in the appendix. Of these we may refer to the Fullarton horse chestnut, 11 feet 5 inches in girth at 5 feet above ground; Loudoun Castle specimens, of which the largest is 13 feet 9 inches at 1 foot, and 14 feet 10½ inches at 5 feet, where it branches into two huge limbs, each a goodly tree in itself; while the Eglinton Castle specimen outstrips all others in the district, and is a very noble tree. It grows in soft light loam upon clay, and is nearly 60 feet in height, and girths 18 feet 11 inches at 1 foot, and 17 feet 9 inches at 5 feet, where its bole divides into a beautifully umbrageous head. This is indeed a very old tree, and shows

evident symptoms of antiquity. It stands near the front court of the castle, and has been clasped very many decades gone by, and bolted on several occasions, the bolt in some cases passing right through the main trunk. Its girth is 17 feet 3 inches at 3 feet, and at 4 feet it branches out into heavy limbs, two of which measure 12 feet 6 inches at the joint with the trunk, and are 9 feet 6 inches and 9 feet 10 inches after they divide. The diameter of spread of branches is 70 feet clear. Soil very damp and marshy.

At Camis-Eskan, Dumbartonshire, growing in light soil and gravelly subsoil, we find two very good specimens, respectively 14 feet 5 inches and 15 feet 6 inches at 1 foot, and 13 feet 3 inches and 13 feet 9 inches at 5 feet above the roots, and thriving in the genial and salubrious climate of the west coast. But for the largest and most remarkable growths, we must look to the more inland counties of central Scotland, where we find the premier specimen of Scotland, at Moncrieffe, Perthshire. This noble tree is now 21 feet 10 inches at 1 foot and 19 feet at 5 feet from the ground, with a massive bole 8 feet in length. This grand tree grows at an altitude of 50 feet above sea-level, and is 80 feet in height. At the point where its bole divides into three large limbs it measures 22 feet 3 inches in girth. The largest limb itself measures 11 feet 8 inches, the next in point of size 10 feet 10 inches, and the third 10 feet 6 inches in circumference. Tradition reports it to be about 250 years old. Walker gives the oldest horse chestnuts in Scotland, and he is corroborated by Gilpin and Sir T. D. Lauder, as growing at Dalwick in Peeblesshire, and they are given in Walker's Catalogue as "perhaps the largest in Britain," and as being then (1780) about 150 years old. Diligent inquiries as to their existence and condition at the present day have failed to elicit any information. So they are probably gone. Here also is another fine tree, which is 80 feet high, and girths 13 feet 8 inches at 5 feet above ground. At Lawers, Perthshire, another magnificent specimen is noticed; and for others, we may simply refer in the following order to the trees detailed in the appendix, from Dunipace (Stirlingshire); Hatton (Mid-Lothian); Edzell* and Gray (Forfarshire); Gordon Castle, and Ballindalloch (Morayshire); while others not quite so heavy, but still of considerable magnitude, in various counties and altitudes and soils, illustrate how well the horse chestnut tree succeeds in Scotland generally as a park tree.

The horse chestnut in Scotland sometimes presents peculiarities in its form of growth worthy of notice. For example, we

* This historical tree "by the old Castle of Edzell," is mentioned as being in 1863, 12 feet in girth at 4 feet above ground, and will be seen to be now 13 feet 9 inches at 5 feet. Its trunk, which was in 1863 slightly decayed by a lodgment of water, is now healed over. Under this tree one of the lairds of Edzell is said to have been murdered by an assassin, employed for the purpose by the betrothed lover of his sister, who was heiress to the estate.

find it in the park of Dunkeld House assuming quite a pendulous or weeping habit. This specimen is a very handsome and vigorous tree. It is now 71 feet high, and girths 16 feet 4 inches at 3 feet above ground. One or two other trees in the district, but not so tall or noteworthy, present a similar aspect. At Biel, in East Lothian, in a low-lying but open site, we find a very handsome tree, on the other hand, with a peculiarly distinct fastigiate habit of growth. It is 102 feet in height, with a clean and handsome bole 40 feet in length, and girths 10 feet 10 inches and 9 feet 11 inches, at 1 and 5 feet respectively. While such extreme and opposite eccentricities are not so common in the case of horse chestnut as in the beech and some other hard-wooded species, we find the round dense "parabola" form of head of the horse chestnut frequently presenting peculiar "sports," and distinctly peculiar growths. Sometimes the form of outline is flat, at other times pyramidal, but densely clothed with branches, and again its contour assumes that of a complete globe. The bark of the bole, also, not unusually resembles, in its curiously regular and spiral twistings, the stem of the Spanish chestnut. An instance of a densely rounded head may be given of a remarkable tree growing at Skene House, Aberdeen. By the kindness of Mr Hamilton, residing at Skene, we are enabled to give details of this curious tree. It is 13 feet 3 inches in girth at 2 feet from the ground, 11 feet 5 inches at 5 feet. The space covered by the branches is 90 feet by 70 feet, but heavy branches have been lopped in from time to time to prevent the tree encroaching on the walks in the garden and surrounding flower beds. About twelve branches or limbs touch the ground, but a clear space is left round the trunk of 22 paces, without obstruction for walking, and a table could be placed to accommodate a very large company, without any obstruction or difficulty, under its umbrageous shade. This old veteran flowers annually, and appears vigorous; but alas! recently only, in taking the measurements of the tree for this paper, a split has been discovered, by which two large limbs have been torn from the main trunk, the split reaching down almost to the centre of the bark and bole, and water is observed to be oozing out on both sides, within 4 feet from the ground. Measures are to be taken at once to retard further decay. No historical reference to this fine old specimen can be found, although evidently its site, appearance, and care bestowed upon its pruning, lead to the conclusion that it has probably been a memorial tree. The place belonged to an old family named Skene, who held it since 1317. The last of the direct line died about fifty-five years ago, when the property went by the female line to the Earl of Fife. The late Earl of Fife boasted of being the "34th laird of Skene." No record of any sale of the property could be found in the Register House, Edinburgh, till about three years ago, and all documents of ancient date or ancestral estate

matters remain in possession of the Fife family, and no information can be traced as to this old and remarkable tree.

It is popularly believed in many districts that the horse chestnut has the property of not being liable to be struck by lightning. Certainly it has been recorded by Evelyn, that in an experience of forty years no instance had ever occurred. Hence also, it was from this belief that we find it so often introduced as a tree for shade and shelter for pasture lands.

There are several varieties of the species, such as *Æsculus rubicunda*, and a double flowering white variety, as well as its yellow kinsman, the *Pavia* or Indian chestnut. Properly speaking, the *Pavia flava* is a distinct species, but they are so very closely allied, and so capable of being hybridised, that the two species may be accepted as one. They are both equally hardy in England, and in most situations in Scotland, if sheltered. The *Pavia flava*, yellow or Californian variety, surpasses most autumn trees in beauty of tint, presenting a beautifully clear yellow colour, and richness of tone quite marked and conspicuous when grouped amongst other varieties. But the horse chestnut itself, of the ordinary variety, is a very showy "*autumn-tint*" tree. Becoming yellow sometimes even in the month of July, it gradually assumes a rich deep russet hue as the season advances. Its luxuriant foliage and majestic appearance in early summer, combined with the handsome candelabra-like blossom spikes in spring, render the horse chestnut a charming object in any landscape; and we must admire it for its beauty, if not for its utility, and for the conspicuous and prominent bearing at a distance, more particularly when in flower, which has obtained for it the soubriquet of "the Giant's Nosegay."

One or two minor commercial uses to which the horse chestnut is adapted have not been noticed, and in closing this paper they may be briefly referred to. Its wood, although light and of little value, as we have said, yet if cut up fresh, may be utilised for ornamental carving, and for the manufacture of articles of domestic use, where a white-grained easily wrought surface is required. The nuts are useful and highly nutritious for deer and sheep. In fact, in some countries on the Continent they are crushed up by machinery, and 2 lbs. weight are given daily, morning and evening, to sheep that are being fattened for market. The nuts when boiled and given to poultry are very beneficial. They also contain a saponaceous principle, and when decayed they turn into pulp or jelly, which has been found to answer the purpose of soap. In Ireland they are used to whiten flaxen cloth, and they make an excellent paste, which is also useful in glazing calico. The bark is sometimes used for a yellow dye, for which it is well adapted. It is also very bitter, and is sometimes used medicinally as a substitute for "Jesuit's bark."

[Appendix.

APPENDIX.—Description of the

County.	Place.	Altitude above Sea-Level in Feet.	Soil.	Subsoil.
Aberdeen,	Keithhall,	200 to 350	Deep loam,	Clay,
,,	Skene House,	...	Loam,	Gravelly,
,,	Invercauld House,	1110	Black loam,	Compact gravel,
,,	Philorth,	40	Soft loam,	Clayish,
Morayshire,	Dalvey,	100	Light loam,	Sandy,
Banff,	Ballindalloch,	470	Good loam,	Clay and gravel,
,,	,,	,,	,,	,,
,,	,,	,,	,,	,,
,,	Gordon Castle,	100	Dark sandy loam,	Bluish sandy clay,
Ross-shire,	Brahan,	100	Rich loam,	Strong clay,
,,	,,	,,	,,	,,
Forfar,	Gray,	...	Black loam,	Sand and gravel,
,,	Kinnaird,	30	Deep sandy loam,	Gravel,
,,	,,	60	,,	,,
,,	Camperdown,	370	Good light loam,	Tilly,
,,	Edzell Castle,	200	,	Gravelly,
,,	Glamis,	230	Black loam,	Gravelly (or red sandstone),
,,	,,	,,	,,	,,
Perthshire,	Moncrieffe,	50	Light loam,	Freestone,
,,	,,	,,	,,	,,
,,	Drummond Castle (Policy)	...	,,	Trap rock,
,,	,, (Wood)	...	,,	Gravel and sand,
,,	,, (Deer Park)	...	,,	,,
,,	Lawers,	...	Gravelly loam,	Sand and gravel,
,,	Abercairney,	150	Good loam,	Clay and gravel,
,,	,,	,,	,,	,,
,,	,,	,,	,,	,,
,,	Blairdrummond,	55	Sand,	Sand and mossy gravel,
,,	Dunkeld,	...	Good loam,	Sand and gravel,
,,	Castle Huntly,	...	Light loam,	Sandy,
Kinross,	Cleish Castle,	550	Light clayey loam,	Clay and gravel,
,,	,,	,,	,,	,,
,,	Kinross House,	...	,,	,,
Fife,	Donibristle,	30	Light loam,	Sandy gravel,
,,	,,	,,	,,	,,
Stirling,	Dunipace,	...	Sharp loam,	Gravel,
Linlithgow,	Carlowrie,	92	Heavy loam,	Clay,
Mid-Lothian,	Ingliston,	98	Loam,	Sand and clay,

Horse Chestnut (*Æsculus Hippocastanum*).

Exposure of Site.	Height of Tree in Feet	Length of Bole in Feet.	Present Circumference of Trunk at			Diameter of Spread of Branches.	REMARKS.
			1 foot.	3 feet.	5 feet.		
	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	
Open,	53 0	20 0	10 3	...	9 6	...	
,,	58 0	9 0	13 0	...	11 3	...	Diameter of spread of branches 90 ft. by 70 ft.
E.	110 0	6 6	...	...	8 7	55 0	Contents 103 cubic feet. Flowers annually, but fruit does not form.
N.E.	60 0	13 0	10 8	...	9 3	...	
...	45 0	10 0	10 3	...	8 10	90 0	Californian or yellow variety (Pavia). Forms a magnificent arbour.
Open,	70 0	18 0	10 4	...	8 9	...	
,,	65 0	15 0	13 9	...	9 3	...	
,,	70 0	14 0	16 2	...	12 6	...	
N.E.	65 0	...	21 8	...	13 6	92 0	
W. and S.	58 0	30 0	12 10	...	11 8	...	
W. and S.	65 0	10 0	...	16 0	...	...	A splendid tree in Brahan Policy.
Sheltered,	63 0	13 0	16 2	...	12 1	76 0	North-east of Gray House. A very fine specimen.
Open,	55 0	28 0	14 3	...	12 6	...	
,,	45 0	16 0	11 4	...	9 8	...	
S.W.	40 0	13 0	9 6	...	8 5	...	
...	65 0	12 0	15 2	...	13 9	40 0	Girthed 12 ft. at 4 ft. from ground in 1863. Grows on north side of Castle Edzell, popularly believed to be 500 years old.
...	90 0	50 0	11 7	...	8 11	...	
Open,	55 0	10 0	15 3	...	9 10	75 0	In front of Castle.
S.W.	80 0	8 0	21 10	...	19 0	...	In 1863, 21 ft. 3 in. at 1 ft., and each limb girthed 10 ft. 6 in. Girths at 8 ft., where trunk divides into three huge limbs, 22 ft. 3 in. A noble tree.
...	80 0	14 0	16 6	...	13 8	...	Planted at same time as the foregoing.
...	65 0	10 0	19 3	...	12 6	80 0	
...	71 0	11 0	13 9	...	9 5	74 0	On roadside from Castle to loch.
...	84 0	18 0	12 0	...	11 3	...	
...	63 0	15 0	19 5	...	14 8	...	
...	58 0	20 0	9 7	...	8 9	...	A very handsome tree.
...	60 0	15 0	9 11	...	8 8	...	
...	50 0	30 0	11 9	...	8 9	...	
...	63 0	7 0	9 11	...	8 8	...	
...	70 0	...	...	16 4	...	...	A very handsome tree, of peculiar weeping habit.
...	55 0	10 0	12 6	...	11 5	...	
...	65 0	25 0	13 5	...	12 5	...	
...	60 0	24 0	11 8	...	8 11	...	
...	55 0	15 0	12 2	...	10 9	...	Several here of similar size.
...	60 0	20 0	...	5 9	...	...	
...	73 0	20 0	...	10 7	...	...	
S.W.	64 0	21 3	19 8	...	14 9	66 0	
Sheltered,	56 0	12 0	12 1	...	10 2	82 0	
Open,	75 0	15 0	16 0	...	12 8	...	

DESCRIPTION OF THE

County.	Place.	Altitude above Sea-Level in Feet.	Soil.	Subsoil.
Mid-Lothian,	Ingliston,	98	Loam,	Sand and clay,
,,	Newbattle,	95	Good loam,	Open gravelly,
,,	Hatton House,	...	Sandy clay,	Clay and gravelly,
Haddington,	Belton,	70	Red loam,	Gravel and freestone,
,,	Biel,	85	Clay loam,	Damp gravelly,
,,	Yester,	400	Clay,	Clay,
,,	,,	,,	,,	,,
,,	Gilmerton,	...	Clay loam,	Tilly clay,
,,	Tyninghame,	40	Red loam,	Sand,
Berwickshire,	Duns Castle,	...	Light,	(Gravel and damp) clay,
Roxburghshire,	Wells,	500	Loamy,	Gravel and sand,
Dumbarton,	Camis-Eskan,	...	Light soil,	Gravelly,
Renfrewshire,	Pollok Park, Eastwood,	120	Alluvial,	Sandstone,
Ayrshire,	Eglinton Castle,	...	Light loam,	Clay,
,,	Loudoun Castle,	350	Loamy,	Loose gravel,
,,	,,	250	,,	Clayey,
,,	,,	500	Sandy,	Clay,
,,	,,	,,	Clay,	Marly clay,
,,	,,	,,	,,	,,
,,	,,	,,	,,	,,
,,	,,	,,	,,	,,
,,	Murdostone,	...	Light sandy clay,	Clay,
Bute,	Mount Stuart,	80	Sandy loam,	Rock,
,,	Kames Castle,	30	Gravelly soil,	Gravel,
Kirkcudbright,	Ardwall,	30	Good loam,	Sand and gravel,
Dumfries,	Kirkconnell,	...	Light loam,	Sandy gravel,
,,	,,	...	,,	,,
,,	,,	...	,,	,,

HORSE CHESTNUT—*continued.*

Exposure of Site.	Height of Tree in Feet.	Length of Bole in Feet.	Present Circumference of Trunk at			Diameter of Spread of Branches.	REMARKS.
			1 foot.	3 feet.	5 feet.		
	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in	
Open,	72 0	8 0	13 3	...	12 7	...	Goes into two huge limbs, 5 ft. 5 in. and 6 ft. 8 in. respectively in girth, and head is iron-hooped or clasped together.
S.W.	75 0	15 0	14 3	...	13 0	103 0	
E.	48 0	33 0	18 2	...	16 3	...	A splendid specimen.
...	75 0	50 0	...	11 9	...	...	A magnificent tree. Close to house.
Sheltered,	99 0	40 0	10 11	...	9 10½	...	Very upright in habit.
,,	55 0	...	9 8	...	8 6	...	Near flower garden. Ninety years planted.
,,	57 0	...	11 1	...	9 11	...	In "Anna Park."
,,	72 0	24 0	13 3	...	10 6	...	One of a fine avenue. All others of similar size.
E.	60 0	18 0	11 8	...	10 4	...	
...	44 0	18 0	13 4	...	11 3¼	...	Growing near margin of lake.
...	40 0	20 0	10 3	...	8 5	...	
...	65 0	12 0	14 5	...	13 3	...	
S.W.	80 0	18 0	15 6	...	13 9	...	In 1860, this tree girthed 13 ft. 7 in. at 1 ft., and in 1836, 10 ft. 1½ in.
S.W.	56 0	5 0	18 11	...	17 9	70 0	
Sheltered,	58 0	12 0	13 2	...	9 5½	...	
...	60 0	4 0	13 9	...	14 10½	...	Branches into two stems at 4 ft.
...	45 0	15 0	9 3	...	9 0	58 0	
...	50 0	20 0	7 2	...	6 8	56 0	
...	48 0	16 0	9 3	...	8 7	72 0	
...	60 0	15 0	10 4	...	9 4	78 0	
...	43 0	12 0	10 0	...	9 8	63 0	
...	53 0	14 0	10 4	...	9 10	...	
Sheltered,	85 0	...	11 10	...	10 9	..	
Open,	76 0	5 6	13 2	...	12 1½	73 0	A beautiful specimen. Branches sweeping the ground very gracefully.
...	75 0	...	...	12 2½	12 3½	...	Grows within 200 yards of the sea.
...	55 0	20 0	12 5	...	11 0½	72 0	Very handsome specimen. In front of mansion house.
...	40 0	14 0	10 7	...	9 11	89 0	Shaped like a huge mushroom.
...	65 0	25 0	11 11	...	10 9½	...	In plantation, a "drawn up," but a fine tree.

THE OLD AND REMARKABLE WALNUT TREES IN SCOTLAND.

By Robert Hutchison of Carlowrie.

[*Premium—Five Sovereigns.*]

Whatever difference of opinion may exist in the minds of arboriculturists as to the indigenous nature of some other species of hard-wooded trees to Scotland, or even to Britain, there can be no doubt regarding the walnut having been an importation and a foreign acquisition to our Sylva. Old and large examples at the present day are few in number, and, like the Spanish chestnuts,—with which in point of introduction the walnut seems to be coeval,—are generally found around ruined monastic buildings and foundations, or adjoining the castellated remains of the strongholds of feudal barons of the Middle Ages, in sites which appear to have been carefully selected, with due regard to prominence and yet shelter, where the cherished nut tended with care, and probably the memento of some distant pilgrimage, might remind the old monk of some foreign shrine, or recall to the memory of the gallant knight-errant in after years in his native land, the grateful shade and refreshing fruit of its parent tree, under whose umbrageous branches he had rested after the toils of the battle-field. Some authorities ascribe the introduction of the walnut to the Romans during their occupation of Britain, but however this theory may hold good as regards the southern parts of England, it cannot be supported by either fact or inference, if we take the oldest survivors in Scotland as living witnesses, or notice the total absence of all traces of any remains, or even of later specimens existing at or near to any Roman station in Scotland.

Few, if any, walnuts appear to have existed in this country, north of the Tweed, earlier than about the year 1600. It is a curious fact, that Dr Walker, who wrote his Catalogue after about forty years of patient compilation, mentions only *four* "remarkable" walnut trees in Scotland, and Sir Thomas Dick Lauder in 1826 adds none to the list which the old Professor had collected. The cause of this scarcity of good examples existing in Scotland about the beginning of the century will be afterwards referred to, and probable reasons assigned for it, but meantime, we may glance at these old walnuts noticed and recorded by Walker, and endeavour to identify any of them at the present day, and notice their growths and condition. It should be observed also, that the otherwise very fastidious arborist and collector Dr Walker condescends to notice in his

scanty list, three trees of no notable size whatever, thus showing that very few trees of dimensions worth recording were known to him from 1760 to 1790; and so minute and exacting an inquirer into all nature's secrets was Dr Walker, that if many fine trees of the walnut species had then existed in this country, even at wide and distant points, his industrious and intelligent investigations would have led him to them, and he would have certainly discovered and recorded them. Walker's first mentioned walnut is one growing in the garden at Lochnell in Argyleshire, which, in July 1771, girthed 3 feet 3 inches at 4 feet from the ground, and was 25 feet in height, and was then known to be exactly thirty-six years old. It is to be regretted that repeated inquiries made as to the existence and condition and size of this tree at the present day, for the purpose of this paper, have been met with no response regarding it.

Walker's second walnut grew at Alva, Stirlingshire. It was planted in the garden by Sir John Erskine anno 1715, in presence of his brother the Lord Justice Clerk Tinwald, afterwards proprietor of the estate. In October 1760, at 2 feet from the ground, it girthed 5 feet 4 inches. This tree we find, after careful inquiry, is departed, but neither date nor manner of its decease has been preserved or recorded. Walker next refers to "a number of walnut trees at Cames" (Kaimes), isle of Bute, "vigorous and well grown," which in September 1771 were about seventy years old. "They were then," he remarks, "between 50 and 60 feet high, and the largest of them girthed at 4 feet from the ground, 6 feet 1 inch." On inquiry and careful investigation by Mr Kay, the able and intelligent wood manager on the Kaimes estate, we have ascertained that none of these trees now exist. When they were felled, or how they disappeared, not even the oldest inhabitant can tell, so much had they probably been regarded as merely ordinary hard-wooded trees at the time of their disposal. It is, however, somewhat remarkable than in the island of Bute, a district isolated, and replete with many very remarkably large and notable trees of almost every variety, no instance of a walnut of anything like timber size has been obtained. Thus it is that frequently in the most likely localities, as regards soil, climate, and other circumstances, the enthusiastic explorer is disappointed, while in the most unexpected quarters, often rare and remarkable specimens of different descriptions of trees are found. And as a further instance of this, we need only notice Walker's fourth, and indeed only large walnut, — which "grows," says he, "before the front of Kinross House, in Kinross-shire, and in "September 1796, measured at 4 feet from the ground 9 feet 6 inches in circumference." He further adds—"The house of Kinross was finished by Sir William Bruce in 1684, and the

tree appears to be coeval with the house. It is probably the oldest and largest walnut tree in Scotland, and is evidently on the decay, but whether this proceeds from accident or from age it is uncertain." Gilpin, in 1791, in noticing this tree (but without reference to its girth at that date), says, "there are many walnut trees of a size, equal if not superior to that of this tree.' From recent inquiries made for the purposes of this paper,—and seeing it is not mentioned in the Highland Society's Catalogue of Old and Remarkable Trees, collected in 1863,—we find, and are glad to state that the old veteran is still alive, and in considerable vigour. It now measures at 4 feet from the ground 23 feet in circumference. It is unfortunately shorn of much of its grandeur, from having lost some of its largest limbs, but still evinces considerable vitality.

Of the more recently collected statistics of the walnut in Scotland, we may recapitulate those of the Highland Society's list, which we have been able to trace, before proceeding to consider and describe existing notable specimens at the present day, given in the appendix to this paper, and not hitherto recorded. The number we have been able to tabulate of trees in Scotland at the present day in the appendix is 39,—while those given, and many of them of smaller dimensions, in the returns collected in 1863, number only 13. The venerable tree which is recorded as growing at Eccles, Dumfriesshire, and which in 1863 girthed 22 feet at the base and 13 feet at 12 feet from the ground, is now no more, having been blown down in a gale a few years ago. The old walnut recorded in 1863, "in a vigorous condition," growing near the mansion house of Belton, and then 65 feet high, and girthing at 5 feet from the ground 15 feet 4 inches and at 7 feet 16 feet 8 inches, was measured in 1880, and found to be at 5 feet from the ground 16 feet 1 inch, and although the foliage was healthy, the tree had evidently ceased to grow, many branches giving symptoms of decay. The severe winter of 1880–81 proved too much for this hoary veteran, and he died its victim, and was taken down last year. It has not been found possible to identify precisely any of the other specimens given in the catalogue of 1863, or of those in Loudon's scanty list made up in 1834.

Coming now to the descriptions of the old walnuts tabulated in the appendix to this report, we notice first, the old tree still growing, but in a very decaying condition, at Flowerdale, Ross-shire. It still exhibits the remains of a fine tree for that latitude, and considering the situation it occupies. It girths 9 feet 5 inches at 1 foot from the ground, and 8 feet 4 inches at 5 feet, and is now 55 feet in height. It stands in front of the house of Flowerdale, in a sheltered glen only about a quarter of a mile from the sea, and about from 30 to 40

feet above its level. The site is the most westerly point on the mainland of Scotland where trees grow. Nothing is certainly known of its age, but from circumstances connected with the history of the Mackenzie family, it was in all probability planted between 1755 and 1760. Another fine old walnut in the north of Scotland is at Altyre (Morayshire). Viewed in 1881, this venerable patriarch, which stands close to the mansion house, has evidently seen its brightest and best days; but hooped as it is with strong iron clasps, it may stand the blasts of many a winter yet. It is quite hollow, has three large limbs still remaining, a fourth having been removed as it threatened an outhouse of the mansion, and is now, though crowned with a leafy head, evidently "living on its bark." It girthed 15 feet 2 inches at 1 foot and 13 feet at 4 feet from the ground. The soil is a deep sandy loam, recumbent on gravel. It yields large crops of fruit, which ripen almost ever year. There are other trees in Morayshire of nearly similar dimensions, but on account of the soil and situation which they occupy, being somewhat later, it is only in very favourable seasons that their fruit becomes fit for dessert. Since the notes for this paper were prepared, it is unfortunate to have to record regarding this interesting old walnut, and also regarding the one at Moy (Morayshire), also mentioned in the appended list of old trees, that both veterans succumbed to the wrestling hurricane of 26th February 1882. The largest walnuts, and probably with few exceptions the finest trees as specimens found in Scotland, are in Perthshire. Referring to those noticed in the appended list, specially may be noted the fine example growing at Moncrieffe, in a light loam soil, upon a gravel subsoil. This tree, which is extremely picturesque, is the last survivor of a fine group which occupied a space of ground, supposed to have been adjoining the original garden. The largest erect tree of the group measured in 1880, 13 feet 7 inches at 1 foot from the base, and 10 feet 9 inches at 5 feet from the ground. The trees composing this group had to be taken down in April 1881, for the extension of an avenue, and the only survivor left, and already referred to, is now, at 5 feet from the ground, 11 feet 4 inches in circumference. It is, however, considerably decayed and lying in a procumbent position on the ground, but it is still evincing its vitality by a good crop of walnuts this season, well filled, and quite fit for table use.

The system of planting walnut trees in groups does not appear to have been so common in Scotland during last century as in England. It appears rather to have been the practice to plant in lines or in straight rows at considerable distances apart, and this plan was probably adopted from a belief that the heavy foliage and dense shadows cast was inimical to the crops under-

neath and around, and an idea also prevailed that the bitter juices contained in the falling leaves in autumn were injurious to the soil. Traces, however, do exist where the walnut has been planted to form avenues to old buildings. One of the finest of these is still to be seen at Logiealmond, within two hundred yards of the old mansion house. Many of the trees once forming this fine and imposing old avenue were blown down during the great gale in December 29, 1879, when the Tay Bridge disaster occurred; and one or two also succumbed to the storms of last spring (January and February 1882). There are, however, still seventeen trees standing, and at present four of the last blown ones are lying on the ground as they fell. The trees, reckoning from the concentric circles, are about 110 years of age; the largest still surviving measures, at 1 foot above the surface 10 feet 3 inches, at 3 feet it is 8 feet 8 inches; and at 5 feet, 8 feet 1 inch in circumference. The seventeen trees will average from 6 to 10 feet in circumference at 1 foot from the ground. The Kinross House walnut has long been considered to be the largest tree of its species in Scotland; but this is not so, for reference to the appended list will show that at least one tree is larger. This premier walnut exists at Stobhall, Perthshire. It is no less than 26 feet in girth at 1 foot and 21 feet 2 inches at 5 feet from the ground, with a massive bole 12 feet in length, and a total height of 70 feet, and the diameter of its spread of branches is 99 feet. It is in a vigorous condition. Another picturesque old Perthshire walnut is to be seen at Abercairney near Crieff. It stands near the site of the old mansion house. The inside of the trunk and heavy limbs are very much decayed and quite hollow, so that a full-grown man can stand inside the trunk, while the holes in the giant limbs are the haunts of many species of the feathered tribe. The top of the tree appears quite vigorous, and when in foliage looks perfectly healthy. It grows in a good loamy soil, upon clay and gravel subsoil, at an altitude of about 120 feet above sea-level.

Growing on the lonely island of Inchmahome, in the lake of Menteith, are some interesting and picturesque old trees. They are chiefly Spanish chestnuts, but amongst these are several walnuts around the old garden of the priory. One fine specimen given in the appendix, stands sentinel-like and confronting a large Spanish chestnut at the western gateway of the priory. These two trees, as well as others of the same species, have evidently been selected to fill special points in what has in the Middle Ages been a well-laid out and artistically arranged pleasure ground. The Spanish chestnuts on the island have been already described in the chapter on that species, and need not now be referred to. Mary, Queen of Scots, when a child,

is said to have resided for a time on this island; and part of the old garden, the quaint walks of which are still traceable, with their boxwood edgings now grown into trees 20 feet high, and fully 3 feet in girth, still bears the name of "Queen Mary's bower," and "Queen Mary's garden." The walnut tree referred to in this site is still sound to all appearance, and its foliage looks quite healthy, while it fruits quite freely every year; but from a crevice near the root on the east side, it is "oozing" slightly, as old walnuts frequently do, indicating incipient internal decay.

The finest walnuts in Fife are to be found at Otterstone, near Aberdour; and at Balbougie, on the Fordell estate, near Inverkeithing, there is a very handsome specimen. It is commonly reported to be "the finest walnut tree in Scotland;" but however highly it may rank in point of symmetry and general contour, its dimensions and bulk of timber are eclipsed by several trees in other localities, and by some of those to which reference has been made. It is, doubtless, a very fine tree, and is 55 feet in height, with a bole of 12 feet, girthing 13 feet 6 inches at 1 foot and 12 feet 3 inches at 5 feet from the ground, and the diameter of its spread of branches is 63 feet. The Otterstone trees are more majestic, but unfortunately two of the finest of this group fell in the awful gale of 14th October 1881. The largest of these girthed no less than 16 feet at 12 feet from the ground, and one limb alone was 13 feet 6 inches in girth, above the 12 feet measurement of the bole. Each tree contained from 9 to 10 tons of beautifully sound and valuable timber, great difficulty being experienced in transporting the trunks to the railway, for, owing to their immense bulk, no janker in the neighbourhood was either large or powerful enough to take in either tree. The other tree, it may be stated, was 18 feet in girth at 20 feet from the ground. The two trees were sold for a little over £50 for cabinet work, and the roots were sold separately for gun-stocks, and were most beautifully striated with richly coloured markings. The date over the old doorway of the oldest portion of Otterstone mansion house is 1589, and the walnuts, Spanish chestnuts, beeches, and other magnificent timber trees adjoining the garden and house appear to be coeval with this portion of the building.

We need only notice cursorily the walnuts of notable appearance and dimensions to be found south of the Forth, as for instance at Dundas Castle (Linlithgowshire), Duntarvie Castle (Linlithgowshire), Newbattle Abbey and Edmonstone (Mid-Lothian), where the largest specimen south of the Forth which we have been able to find still exist. It is now 18 feet 2 inches at 1 foot and 17 feet 3 inches at 3 feet from the ground. The soil is a strong blue loam, overlying the

Mid-Lothian Coal Measures, and the altitude of the site is 320 feet. The tree is quite vigorous. Fine examples are also recorded in the appendix at Belton, Salton Hall, and Yester (East Lothian), and Milnegraden (Berwickshire). At Wells (Roxburghshire), at an altitude of 500 feet, we find a very fine tree with a beautiful bole of 15 feet, and girthing 10 feet 8 inches and 9 feet 2 inches at 1 and 5 feet respectively, showing the suitability of the walnut to such an altitude. In the south-west division of Scotland, fine trees are found at Cessnock Castle (Ayrshire); and in the quaint old churchyard of Kirkconnel (Dumfries), a picturesque old example still exists. It is 50 feet in height and girths 14 feet at 1 foot and 13 feet 10 inches at 5 feet above the ground. This fine old tree is very much swayed to one side, from the soil and subsoil both being sandy, and its three massive heavy limbs, which spring quite horizontally from the trunk in one direction, with their additional weight of foilage, being a severe strain upon the roots. It presents a very weird appearance, and is an appropriate and suitable feature in the foreground of the quaint old parish churchyard and its surroundings.

Having thus discussed the statistical features of the principal trees in Scotland which we have been able to discover, we may now proceed to notice the general characteristics of the walnut, and its capabilities and value as a timber tree in Scotland.

The scarcity of old and remarkable walnuts in Scotland, both at the present day and when the older authorities, such as Evelyn, Walker, Selby, and Loudon collected statistics, has been already referred to, and we may now, perhaps, consider if it is not possible to discover the reason why a tree so valuable, alike for its fruit and for the high price which its timber fetches when of large size, is not found so extensively distributed over Scotland as one might expect it to be, considering these special qualities, and its suitability of habit and hardihood to our climate. That is it quite hardy in Scotland there can be no doubt, for we find it even in the northern counties of Scotland of large size, highly ornamental and regularly fruiting, and in favourable autumns ripening its fruit sufficiently for use as dessert. Nor is the soil unsuitable, for it will thrive in almost any soil not water-logged, though it prefers, like the oak, a strong adhesive loam, if the subsoil be well drained or free from constant damp. Nor does altitude of site much affect it in this country, for we find it of large size and quite hardy, flourishing at altitudes of 500 feet and upwards in Scotland, as, for example, at Wells (Roxburgh shire), where it is 10 feet at 1 foot and 9 feet 2 inches in circumference at 5 feet from the ground (*vide* appendix);

while at Hawkstone Park, in Shropshire, at 1000 feet above sea-level, there is a fine specimen 99 feet in height, and 22 feet in girth at 1 foot and 16 feet 6 inches at 5 feet from the ground, with a circumference of branches embracing 279 feet. The causes of the scarcity of fine trees in this country must, therefore, be looked for to other than climatic reasons, and it may probably be accounted for on the following grounds. The walnut in Britain never has been, at any period since its introduction, propagated either as a timber or as a fruit tree to anything like the same extent as it has been in France and other continental countries, where from an early date every possible encouragement has been given to its increase and cultivation. In this country it has been more planted as an ornamental or park tree, its chief use when cut down being for the manufacture of gun or musket stocks, for which it was formerly in great demand, and for the supply of which large quantities of walnut timber were imported from the Continent. During the Peninsular wars, when many of the chief continental ports and markets were closed against us, walnut timber in Britain rose to an enormous price, as we may judge from the fact of a single tree having been sold for £600; and as such prices offered temptations which few proprietors were able to resist, a great number of the finest walnut trees growing in this country were sacrificed about that period to supply this trade. The deficiency and scarcity thus created, as well as the high price, led to the introduction of the American walnut timber, as well as of large supplies from the coasts of the Black Sea, from whence any quantity can always be obtained, and at prices lower than the timber can be grown for in Britain. Hence this facility of procuring unlimited supplies from abroad has also done away with the inducement to plant walnut trees in this country, where it is a slow-growing and long-lived tree before reaching maturity as a timber crop, and its cultivation as such may be said to be at an end in Great Britain, and especially so in Scotland. The few specimens left to us of any magnitude show well as trees of position, and for effect, in the landscape, as well as for variety of foliage in mixed plantations, but only as such will the walnut take its place among the forest trees of Scotland in the future. Indeed, it is probably best adapted for planting now as a park tree, or in hedge rows; for, in mixed plantations, its enormous and deep-penetrating roots,—indicating great power and resistance to the elements,—and its impatience of interference, evince its unsocial habits, and mark it out as better fitted for an open or exposed site; and the only objection that can be stated to its extensive introduction as an ornamental tree of first importance, is its late period of coming into foliage

in spring, and the early shedding of its graceful light green pinnate leaves, which fall at the earliest approach of the first autumnal frosts in our latitude. It does not admit of being pruned at all when of any size; this operation, if necessary, should only be done when the tree is quite young, and never close to the main stem. Such treatment would be most injurious to the tree, and its pernicious effects are observable in old trees which have come under our notice in Scotland,—such a process of close-pruning having invariably produced decay more or less at the lower edge of the wound, caused doubtless by the wood being naturally capable only of slow cicatrisation, and also from the soft loose texture of the young wood of a tree which otherwise, when allowed to mature and ripen, produces a timber of close-grained quality, of beautifully coloured and veined appearance, and of the very finest quality for all artistic and ornamental constructive purposes or for internal decoration and furniture.

Evelyn states that it had been observed by a friend of his that the "sap of the walnut tree rises and descends with the sun's diurnal course (while it visibly slackens in the night), and more plentifully at the root on the south side, though those roots cut on the north side were larger and less distant from the trunk of the tree, and that they not only distilled from the ends which were next the stem, but from those that were cut off and separated," and which, he observes, "does not happen in birch, or any other sap-yielding tree."* It is a pity the worthy and observant arborist does not tell us more of the details of the experiments and observations by which he arrived at this conclusion regarding this relation between the sun's diurnal course and the flow of sap in the walnut tree, which he seems to point to as unique. May it not have rather been, or be perhaps, due to lunar influence, if such a phenomenon, as he alleges, exists at all, and afford inquiry, or fair field for investigation into a matter of the most profound interest in the economy of the vegetable kingdom and arboricultural world, viz., the *periodicity* of the rise and fall of sap in trees throughout the various periods of the moon's growth and decline in *all* months of the year,—a function probably which, if better understood and investigated, may be found to correspond to a similar law in the animal kingdom for keeping alive and periodically revivifying and quickening the latent forces of nature.

Many curious old and superstitious practices and ideas prevailed in the last century regarding the walnut tree. These were particularly common in Germany and in other countries of the continent of Europe. In Frankfort and Hanau in

* Evelyn's *Sylva* (Hunter), vol. i. book i. p. 171.

Germany, until a very recent time, no young farmer was permitted to marry till he had given proof that he had himself planted, and was "the father" of a stated number of walnut trees —a law which was most religiously enforced down to very recent times, so great was the advantage supposed to be to the inhabitants, and to the country generally, from the abundant presence of the walnut tree. In olden times, again, the fruit of the walnut was wont to be strewed by the bridegroom at a wedding,—to indicate that he had, on entering his new phase of life, cast aside his boyish amusements and games, or perhaps more likely to signify that his bride had desisted from being any longer a votary of Diana, to whom the walnut tree was sacred. From a very early date, the individual properties of the walnut, in many parts of the Continent, were held in great veneration and repute. It is almost ludicrous to recount some of its fancied curative properties and the superstitious practices prevalent regarding these; and with respect to the various parts of the tree,—fruit, foliage, oil, and bark. Thus,—a bitter decoction of the leaves and husks of the fruit macerated in hot water, and spread upon lawns or garden walks, would destroy worms and slugs without injuring the greensward. The water of the husks was believed to be an unfailing antidote against all pestilential infections, and that of the leaves to heal inveterate ulcers. The green husks of the fruit boiled used to make a good dye, of a deep yellow colour without any mixture. A distillation of walnut leaves with honey and urine would make hair to grow upon bald heads. The kernel masticated, if applied to the bite of a suspected mad dog, and after it has lain for three hours, if cast to poultry, they will die if they eat it, should the dog have been mad. In Italy, at the present day, the country people drink a pint of fresh walnut oil to cure any pain in the side or liver, and are said to receive immediate relief; but "more famous," says Evelyn, "is the wonderful cure which the fungous substance separating the lobes of the kernel, pulverised and drunk in wine in a moderate quantity, did perform upon the English army in Ireland, afflicted with a dysentery, when no other remedy could prevail." The juice of the rind was also used as an effectual gargle for sore throats.

With such a list of healing virtues, real or supposed, no wonder that the walnut tree has been so extensively propagated in continental countries; and probably, owing to a belief to some extent in these reputed qualities, it was first introduced into this country by the early monks from the continent of Europe; and hence the earliest specimens now extant are, as we have shown, chiefly to be found flourishing beside the mouldering ruins of the old ecclesiastical foundations of their departed hierarchy.

APPENDIX.—DESCRIPTION OF THE

County.	Place.	Altitude above Sea-level in Feet.	Soil.	Subsoil.
Ross,	Flowerdale,	35	Light sandy loam,	Hard boulder gravel,
Moray,	Altyre,	200	Deep sandy loam,	Gravel, sand, and clay,
,,	Moy,	150	,,	Gavel and sand,
Banff,	Gordon Castle,	150	Dark sandy loam,	Bluish sandy clay,
Forfar,	Camperdown,	360	Sandy loam (tilly),	Till,
,,	Ballinshoe Castle,	350	Black loam,	Red clay,
,,	,,	350	,,	,,
,,	Castle Huntly,	200	Sandy loam,	Gravel and clay,
Perth,	Dunkeld,	...	Black loam,	Clay and gravel,
,,	Moncrieffe,	...	Light loam,	Gravel,
,,	Stobhall,	...	Clay and gravel,	Till,
,,	,,	...	,,	,,
,,	Logiealmond,	...	Deep rich loam,	Clay and gravel,
,,	Bendochy Manse,	115	Good black loam,	Clay,
,,	Abercairney,	120	Rich loam,	Gravel and clay,
,,	Garvock,	...	Black stiff loam,	Clay,
Kinross,	Kinross House,	...	Clay loam,	Till,
Stirlingshire,	Alva,	90	Heavy loam,	Clay and till,
,,	Inchenahome Island,	...	Good loam,	Gravel,
Fife,	Balbougie Fordell,	1150	Good loam,	Sand and clay,
,,	Otterston,	100	Sandy loam,	Damp clay,
,,	,,	...	,,	,,
,,	,,	...	,,	,,
,,	,,	...	,,	,,
Dumbartonshire,	Camis Eskan,	50	Sandy loam,	Gravel,
Linlithgow,	Dundas Castle,	200	Good loam,	Clay,
,,	Duntarvie Castle,	230	Deep loam, sandy,	Clay,
,,	,,	...	,,	,,
Mid-Lothian,	Newbattle Abbey,	...	Deep light loam,	Sandy gravel,
,,	Edmonston,	320	Strong blue loam,	Mid-Lothian Coal Measures,
East-Lothian,	Belton,	75	Loam,	Freestone rock,
,,	Biel,	150	Good loam,	Gravelly and clay,
,,	Salton Hall,	170	Light loam,	Limestone,
,,	Yester,	400	Clay,	Clay,
,,	,,	...	,,	,,
Berwickshire,	Milnegraden,	100	Light soil,	Boulder clay,
Roxburgh,	Wells,	500	Good loam,	Gravel,
Ayrshire,	Cessnock,	...	Light sandy,	Till,
Dumfries,	Springkell,	250	Light sandy,	Sand,
Kirkcudbright,	Heughan of Airds,	150	Light loam,	Gravel,

Walnut (*Juglans Regia*).

Exposure of Site.	Height of Tree in Feet	Length of Bole in Feet	Present Circumference of Trunk at			Diameter of Spread of Branches.	REMARKS.
			1 foot.	3 feet.	5 feet.		
	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	
W.	55 0	8 0	9 5	...	8 4	53 0	Growing on the most westerly point of the mainland of Scotland where trees grow, but is now in a decaying condition.
...	63 0	short.	15 2	...	13 0	...	Hooped together with iron bands. Contains about 200 ft. of timber.
...	70 0	11 0	14 3	...	12 2	...	Fell in gale of 26th Feb. 1882.
...	66 0	...	13 8	...	13 4	207 0	In 1838, girthed 9 ft. 6 in. at 5 ft. A very handsome specimen.
S.	48 0	5 6	9 5	...	6 3	...	This tree had originally branched off into two large limbs at 5½ ft. from the base, and from the fork the trunk has now split down to the root, but both heads are quite vigorous and in full foliage.
...	52 0	8 0	17 0	...	15 7	...	
...	65 0	7 0	17 7	...	16 2	...	
S.W.	56 0	...	11 11	...	10 8	...	
Sheltered.	80 0	15 0	13 9	...	12 4	...	
...	...	...	13 7	...	11 4	...	The last remaining of a fine group. It is considerably decayed, but still fruiting.
...	60 0	13 0	10 8	...	9 2	66 0	
...	70 0	12 0	26 0	...	21 2	99 0	
S.	65 0	13 0	10 3	8 8	8 1	...	One of seventeen still remaining of a fine walnut avenue here.
...	48 0	9 0	6 1	...	5 6	...	A very handsome specimen.
...	50 0	9 0	13 6	...	11 8	...	Inside quite hollow, but top vigorous.
...	75 0	17 0	16 4	...	14 6	...	A very magnificent tree.
...	74 0	6 0	23 0	23 0	14 2	...	Divides at 6 ft. into three large limbs. This tree is mentioned by Dr Walker in 1790.
...	60 0	20 0	10 9	...	9 3	...	Blown down Feb. 1882.
...	80 0	18 0	10 1	8 9	8 4	...	At west gateway of old Priory.
...	55 0	12 0	13 6	...	12 3	63 0	Supposed to be one of finest in Scotland.
...	78 0	37 0	...	13 10	12 11	...	Two magnificent walnut trees were blown down here in gale of Oct. 14, 1881. Each tree contained from 9 to 10 tons of timber, and they were sold for upwards of £50 sterling, for cabinet-work and gun-stocks.
...	70 0	5 0	9 5	...	8 6	...	
...	80 0	18 0	13 10	...	11 6	...	
...	75 0	15 0	14 3	...	10 6	...	
...	60 0	13 0	13 9	...	10 3	...	
...	73 0	25 0	14 6	...	12 3	...	Grows on west side of old Norman keep.
...	50 0	20 0	8 3	...	5 11	...	
...	45 0	15 0	7 10	...	6 1	...	Have stood in old castle garden.
S.W.	73 0	...	16 1	...	10 3	...	In stable orchard.
...	71 0	...	18 2	17 3	...	75 0	
W.	65 0	12 0	15 4	...	16 1	..	This tree has had to be taken down, being quite dead this year (1883). Many more fine walnuts here.
E.	72 0	30 0	11 3	...	11 0	...	
...	55 0	...	12 9	...	8 4	...	
...	50 0	...	13 9	...	11 8	...	
...	53 0	...	13 7	...	11 6	...	
...	80 0	25 0	...	...	13 9	...	
...	45 0	15 0	10 8	...	9 2	...	
...	40 0	18 0	8 11	...	6 9	...	
...	50 0	...	14 0	...	13 10	...	Stands in quaint old churchyard of Kirkconnel.
...	37 0	7 0	7 3	...	5 8	...	A very vigorous and handsome tree.

THE BLACKFACED BREED OF SHEEP.

By Alexander Macdonald, Sub-Editor, *North British Agriculturist*, Edinburgh.

[*Premium Five Sovereigns.*]

Introductory.

Beyond vague tradition, we have no reliable indication of the origin of the blackfaced or heath breed of sheep. It is a common belief in Scotland that it is not indigenous to Britain, and many circumstances tend to confirm this opinion. Dr Walker, who is acknowledged to have been a high authority on the subject, supposes that it is of foreign origin, and that the forest of Ettrick was selected as its first locality in Scotland. He mentions that a flock of some 5000 sheep was imported by one of the Scottish kings for the use of the royal household, and from that stock the whole of the blackfaced race, it is supposed, succeeded. The opinions of other writers, however, combined with the natural character of the breed, indulge the belief that there is some truth in the conjecture that it originated among the mountains of Cumberland, Westmoreland, and Lancashire, and that it was introduced into Scotland at an early date. Some people hold, on the other hand, that the blackfaced sheep originated among, and were the earlier inhabitants of, the mountainous parts of the south of Scotland. There is no breed of sheep existing in Britain at the present time to which this breed bears much resemblance, and this, coupled with the fact that the only similar sheep known is Wallachian, goes to support Dr Walker's argument.

The comparatively valueless character of the fleece, as well as the whole figure and general independent bearing of the blackfaced sheep, suggests, or in fact points it out, as the native of a high and stormy region. This peculiarity, says a writer, may in all probability have been derived from the character of the hills where the breed originated. The influence of the soil and climate on the covering of animals is well known, and has been strikingly exemplified in the natural history of the sheep in this and other countries. A humid atmosphere has the effect of lengthening the covering of sheep as well as of other animals. The cattle in the west coast have, as a rule, longer hair than those of the east, because of the dampness of the atmosphere. The depth and quality of the soil are also supposed to exercise a considerable influence on the growth and character of the wool and general development of the sheep.

History of the Breed.

Notwithstanding the inferior quality of the wool, and other defects of this breed in its aboriginal and unimproved condition, its peculiar adaptability to withstand severe climate, and to fatten on the coarsest herbage, commended it to occupiers of large tracts of heath and mountain land; and to quote Hector Boethius, who wrote about the year 1460, and speaking of the sheep in the vale of Esk, says—"Until the introduction of the Cheviots, the rough-woolled blackfaced sheep alone were to be found." From this, it would seem that the blackfaced or heath breed of sheep had been the prevailing breed at an early date. After the introduction of the Cheviot and other fine-woolled breeds, it was supplanted by them in many districts, at different periods during its history—a circumstance regulated by the prices of wool—but the race has never been allowed to die out. The germs of its early fame had never been entirely extinguished, and for many years past they have been gradually regaining strength. It is only within the past century and a half, or litttle more, however, since flockowners began to direct attention to the improvement of the breed, but during that time many defects have been removed. Since the advent of the present century, an enthusiasm has been manifesting itself among sheep farmers to raise the value of their flocks, and a healthy emulation has existed among breeders for upwards of sixty years.

Their desire to resuscitate the faded popularity of their favourite breed has been vastly encouraged by the Highland and Agricultural Society and kindred associations, who at their annual exhibitions, give handsome premiums for the best specimens of the breed. It is a matter for regret, however, that the inducements held forth by these associations have not been more generally responded to. Only the small minority of the breeders have apparently become alive to the importance of devoting means and attention to the amelioration of their flocks. Foremost among the improvers have been the Messrs Gillespie of Lanarkshire; the Messrs Archibald of Overshiels; Mr Charles Howatson of Glenbuck; and Mr Foyer, Knowehead, Campsie. The Glenbuck stock is perhaps the oldest, having possessed a well-known reputation for upwards of a century. It has always been distinguished for its superiority of blood and excellence of type. Before Mr Howatson became owner, the grazing of Glenbuck was in the hands of the M'Kersies, who took a great interest in rearing sheep, and they acquired for their flock a name which will long have a familiar ring among breeders of blackfaced sheep. Mr Foyer, Knowehead, is owner of a very old and celebrated stock; while the flock of the Messrs Archi-

bald, Overshiels, has long been regarded as a source of pure blood, and good breeding. A distinguished sheep farmer, writing to us on the subject of blackfaced sheep, likens them to the favourite tribes of black Polled Aberdeen or Angus cattle, thus—"I should say of the blackfaced sheep which are notable for their long standing and superior breeding, that the Glenbuck stock occupies the position of the 'Ericas,' and the Overshiels and Knowehead stocks the places of the 'Prides' and 'Lucys.'"

Other gentlemen who have aided in the improvement of the breed are Messrs Fleming, Ploughland, Lanarkshire; James Greenshields, West Town, Lanarkshire; T. Aitken, Listonshiels; James Craig of Craigdarroch; R. Buchanan, Letter, Killearn; J. Moffat, Gateside, Dumfries; P. Melrose, Westloch, Peebles; Thomas Murray, Braidwood, Penicuik; John Sloan, Barnhill, Ayrshire; James Duncan of Benmore, Argyllshire; William Whyte, Spott, Kirriemuir; Peter Robertson, Achilty, Dingwall; James A. Gordon, Udale, Invergordon; Donald Stewart, Chapelpark, Kingussie; and Mr Brydon, Burncastle, Berwickshire.

I have to acknowledge my gratitude to several of these gentlemen for their valuable assistance, in placing at my disposal their observations and experiences in connection with the breeding and rearing of blackfaced sheep. Their communications will not only form an interesting appendix to my treatise, but they have served in confirming former opinions. Lanarkshire has from time immemorial been regarded as the nursery of blackfaced sheep, and this and other southern counties have played important parts in the resuscitation of the breed. Their annual sales have been valuable institutions for many years, and have been the mediums through which a great deal of excellent blood has been disseminated. Drafts of young tups from the best breeding stocks in Britain are disposed of at these sales, and the gradual increase of prices obtained for tups during the past quarter of a century, affords a good indication of the growing desire to procure pure blood and fashionable types. The great secret in keeping blackfaces is to avoid overstocking. The importance of this was sadly overlooked in the earlier history of the breed, but with the enlightenment of the past fifty or sixty years this disadvantage has been generally guarded against.

The principal events of the year for breeders of blackfaced sheep are the Lothian ram sales, the Perth sales, and the autumn Falkirk trysts. At all these there is generally a good representation of the leading sheep stocks in Scotland, which country may be designated the home and fountainhead of the breed. The Lothian ram sale is an important event to breeders who go in for high-class stock, and we are pleased to note that these are year by year increasing in number. That they are

increasing in number is well indicated by the fact, that the demand has been gradually becoming more active for many years. This fact has not been so forcibly demonstrated within the past few years, but from 1850 to 1876 there was a very remarkable improvement in the character of the tup market. The increased fastidiousness of flockowners in selecting high-bred tups has been the means of bringing large prices into the hands of a few of the most enterprising and successful sheep breeders. The demand has been pressing for tups extracted from some of the flocks which I have previously mentioned, and the owners of these may be said to have enjoyed a monopoly of the trade. The rise in the prices of high-class stock within the past twenty-five years has been remarkable, and affords additional evidence of the desire now extant to produce an altogether finer race of sheep. Tups which were worth about £7 each twenty-five years ago—and £7 was considered a good price—would now bring from £60 to £70, while £20 each is not considered a very high price for well-bred rams. For ewe stock the demand has been less active, and consequently the advancement in prices of ewe stock has been less marked. Some thirty years ago, however, 25s. was regarded as a more extravagant price for a ewe lamb than 50s. or 60s. would be at the present day.

The great advancement thus indicated in the prices of black-faced sheep has not entirely resulted from one cause. There have been several agents working with combined force in bringing it about. An important one of these agents has undoubtedly been the prevailing anxiety to improve the character of the blackfaced breed, whose natural characteristics are so well calculated to resist the hardships of a severe climate. This anxiety has long existed among a few flock-owners, but it has been gaining a hold upon the majority in recent years, and extending rapidly. The causes for this are not far to seek or ill to find. The revolutionary tendency of the wool market, and the meteorological severity of the past eight or ten years, have turned the attention of many admirers of finer woolled breeds to the blackface. In all industries the branches expected to yield most profit are generally pursued, and it is believed, if indeed not actually proved, that considering the scanty fare on which this breed subsists, and even thrives, Highland flocks are on the whole most profitable. What proves an obstacle to the development of pastoral pursuits in Scotland, however, is the large extent of deer forests. Fashion is the all-powerful agent which has been at the bottom of the mania for creating and extending these. It was estimated in 1873 that the number of sheep displaced by forests in Scotland was 400,000, while it has been computed that since then the

number of sheep displaced has been raised to 481,550. The number of forests in 1872–73 was said to be between 60 or 70, and now, including those only partially cleared, the number is 96. Of these 96 forests there are 5 in Aberdeenshire, 6 in Argyllshire, 1 in Banffshire, 1 in Caithness, 5 in Forfarshire, 33 in Inverness-shire, 5 in Perthshire, 37 in Ross and Cromarty, and 3 in Sutherlandshire. The total number of sheep in these counties at present is about 3,363,414.

Many experiments have been tried during the history of the Highland breed of sheep with a view to the improvement of its wool. These were conducted in various parts of the south and north of Scotland, by way of crossing blackfaced ewes with tups of other breeds, but the results have invariably been disappointing. The experiments tended rather to degenerate instead of improve the Highland breed. "Some time is required," says a sheep-farmer, "before the blackfaced stock can be restored to its natural purity after being crossed with tups of other breeds." Crossing blackfaced ewes with Leicester rams is a common practice among flockowners who fatten their young stock for the market. In these circumstances, such a course is justifiable and commendable, as it produces heavier and earlier-maturing lambs.

The depreciation of the finer varieties of wool in the wool market arises from the fact that the demand is being supplied from other countries. The Cheviot and Leicester breeders are thus being undersold by their foreign competitors, and the breeders of Highland sheep would share the same fate, if the wool of the blackfaced sheep had not a speciality which adapts it for peculiar purposes. Its coarse, shaggy fibre is found to be more durable and serviceable in the manufacture of carpets and other rough textures than any other variety of wool.

The following is a comparative statement of the average prices of white wool of both Cheviot and blackfaced sheep since 1860:—

	Cheviot.				Blackfaced.			
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
1860,	from 1	6½ to	1	7½	from 0	8½ to	0	10
1861,	1	6½	1	5	0	9½	0	9
1862,	1	6	1	7	0	9	1	0½
1863,	1	7½	1	10	1	0½	0	11
1864,	1	10½	2	4½	1	0	1	3½
1865,	2	0½	1	7	1	0½	1	1½
1866,	1	11	1	7½	1	1½	0	11⅛
1867,	1	8	1	5½	0	10½	0	8½
1868,	1	1½	1	5	0	6½	0	7½
1869,	1	4½	1	3½	0	7½	0	7
1870,	1	3½	1	2	0	7½	0	7
1871,	1	2½	1	10½	0	8	1	1½
1872,	2	2	1	9	1	4	1	0

	Cheviot.				Blackfaced.			
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
1873, . from	2	1 to	1	8	from 1	2 to	0	9
1874, .	1	8½	1	7	0	10½	0	10
1875, .	1	7	1	8	0	10	0	10½
1876, .	1	7½	1	4½	0	10	0	8
1877, .	1	5½	1	4	0	9	0	8
1878, .	1	2	1	3½	0	8	0	9
1879, .	0	11½	1	1½	0	6	0	7
1880, .	1	3	1	5	0	8	0	8½
1881, .	1	3	1	2½	0	7½	0	7
1882, .	1	2	1	1½	0	7½	0	7
1883, .	0	9	0	11	0	6	0	7½

These figures show a great irregularity in the prices of wool, the result of the fluctuations being a very considerable decline during the past ten years. It will be observed, however, that in consequence of the cotton famine and American war in 1864, the prices of both classes of wool rose materially in value, and continued high till the end of 1867. Another ascendency took place in 1872, as a result of the Franco-Prussian war in 1870–71, but since then the variations have been less marked. The prices of Cheviot wool have been falling more rapidly than those of blackfaced sheep, which is shown to have been at as low an ebb as 7d. in some former years, but not within living memory has the price of Cheviot wool been so low as it now is (1883). In reference to this subject, Mr Aitken, Listonshiels, says—"Owing to foreign competition, wool has been selling very cheaply of late, being nearly as low as it was fifty years ago, the difference being from 1d. to 2d. per lb. for wool of the best quality. Highland wool in some cases only brings 5d. per lb., while in 1864 the current price was as high as 1s. 3d.—more than double the present selling rate."

Though for many centuries the prevailing breed in the mountainous parts of the south of Scotland, the blackfaced sheep were not introduced into the north until a comparatively recent date. The Cheviot breed was largely scattered over the northern counties before this hardy species had passed the Grampians. For at least a century, however, blackfaced sheep have been in possession of northern farmers, and within the past twenty or thirty years they have greatly increased. Cheviots still hold a place in the counties of Caithness, Sutherland, Ross, and Inverness; but for many years they have been losing ground, and the Highland breed on the ascendency, both north and south. The leading promoters of the breed in the north are Mr Robertson, Achilty, who has a large sheep run attached to his arable farm; Mr Gordon, Balmuchy; and Mr James Gordon, Udale. These gentlemen are careful in their selection of tups, and raise equally as good tup lambs as those

to be met with in the south of Scotland. A writer, in describing a tour from Land's End to John o' Groats, in 1864, made the following reference to the upper reaches of Strathspey, in which the counties of Perth, Banff, and Inverness all join :—

"The sheep in this region are chiefly the old Scotch breed, with curling horns and crooked faces and legs, such as are represented in old pictures. The black seems to be spattered upon them, and looks as if the heather would rub it off. The wool is long and coarse, giving them a goat-like appearance. They seem to predominate over any other breed in this part of the country, yet not necessarily nor advantageously. A large sheep farmer from England was staying at the inn, with whom I had much conversation on the subject. He said the Cheviots were equally adapted to the Highlands, and thought they would ultimately supplant the blackfaces. Although he lived in Northumberland, full two hundred miles to the south, he had rented a large sheep walk or mountain farm in the Western Highlands, and had come to this district to buy or hire another tract. He kept about 4000 sheep, and intended to introduce the Cheviots upon these Scotch holdings, as their bodies were much heavier, and their wool worth nearly double that of the old backfaced breed. Sheep are the principal source of wealth in the whole of the north and west of Scotland. I was told that sometimes a flock of 20,000 is owned by one man. The lands on which they are pastured will not rent above one or two English shillings per acre; and a flock even of 1000 requires a vast range, as may be indicated by the reply of a Scotch farmer to an English one, on being asked by the latter one, 'How many sheep do you allow to the acre?' 'Ah mon,' was the answer, 'that's nae the way we counts in the Highlands; its how monie acres to the sheep!'"

Cheviots were then, as already indicated, displacing the Highland breed in many parts of Britain, but since that time a very material change has taken place. Even the green mantled hills of the south are being more extensively put under blackfaces every year. "From the time of King James down to the year 1785," says Hogg, in his *Statistics of the County of Selkirk*, "the blackfaced or forest breed continued to be the sole breed of sheep reared in this district; and happy had it been for the inhabitants had no other been introduced to this day." The latter clause of Mr Hogg's remarks will, we have no doubt, be very freely re-echoed by many flockowners who have had the disagreeable experience of changing stocks, as the maxim of supply and demand required. A writer on the subject, in the year 1844, states that in the south of Scotland "Lord Napier made strenuous and successful exertions to arouse and direct the solicitude of sheep farmers to the improvement of the

Highland breed. In the Vale of Ettrick he began *con amore* to take and to give lessons on sheep husbandry; and in 1819 he succeeded in forming a pastoral society, which since the date of its establishment has steadily and successfully directed the energies of the farmers." "So early as 1798," continues the same writer, "the majority of sheep walks in the south were stocked with Cheviots, but the old blackfaced sheep, in the rough character which belonged to it before the era of modern improvement, was some fourteen or fifteen years ago reintroduced to two or three farms in the county of Selkirk, but it has never reacquired favour, or been fairly tolerated, except where the less hardy whitefaced sheep is too fragile for the abrasions of the climate."

Characteristics of the Breed.

The nature and habits of the blackfaced sheep are truly Highland. When left for a short time on the hills unmolested it becomes wild, and wherever depasturing during the day, it has the peculiarity of returning regularly to one particular spot over night. It seeks its bed on elevated ground, and it is both pleasant and interesting to watch its instinctive movements on the hillsides on a fine summer evening. About sunset it repairs to its sleeping ground, and in olden times it was regarded as a foretaste of good weather if the flocks moved early and heartily to their lodging places.

The following are the points which pure-bred tups should possess:—Long-wool; evenly covered body, with a glossy or silky appearance; legs, roots of the ears, and forehead (especially of lambs) well covered with soft fine wool; the muzzle and lips of the same light hue; the eye bright, prominent, and full of life; the muzzle long and clean, the jaw being perfectly bare of wool; the ears moderately long; the horns with two or more graceful spiral turns, springing easily from the head, inclining outwards, downwards, and forward—the upper edge of each turn being horizontal with the chaffron; the carcase long, round, and firm; the neck thick and full where it joins the shoulder; the shoulder bones well slanted; the limbs robust and chest wide; and the ribs well curved and full, wool coming well down on the thighs and chest; face and legs, if not entirely black, should be speckled, and the hind legs well bent at the hocks, and free from black spots or "kemps." The general figure of the ewe is the same as the tup, but the horns should be flat and "open," or standing well out from the head. Big-boned lanky sheep, with narrow chests and flat ribs, are generally of weak constitution, and these, as well as sheep with bare hard hairs on their legs, breast, neck, and face—which are far too common—

ought to be got rid of. On these animals there is a great proportion of the wool "kempy," or full of hard white hair, and destitute of felting property. It is observed that sheep with strong or rising noses are generally hardier in constitution than those with weak hollow faces. The most objectionable point of the present race of Highland sheep is the inferiority of its wool. The average yield is as nearly as possible 4½ lbs. per hogg, 3½ lbs. per ewe, and from 4 to 5 lbs. per wether. The return, both in quantity and quality, varies in accordance with the nature of the pasture, soil, and climate on which the sheep are kept. A higher return is obtained in the south of Scotland than in the northern counties. Where the sheep are pastured on strong grassy land, the quality of the wool is finer than when they are confined to heathery pasture; but the latter gives an additional flavour to the mutton, which is a favourite commodity in the metropolitan markets. The females of the blackfaced breed are not so prolific as those of the Cheviot or Leicester breeds, there being as a rule a return of only one lamb for each ewe. It sometimes happens, however, that Highland ewes have two lambs, but in the majority of cases, or in fact in nearly every case, they give birth to and foster only one lamb. The number of ewes allotted to each ram varies with the different systems of management, but one tup has often been known to sire over 60 lambs.

On the better farms in the south of Scotland the return of wool is considerably heavier than on the northern pastures, having been greatly improved since the pastures came under the management of the present tenants. As an instance of this, I may mention that in 1864, which was a fairly representative year, the average weight per fleece of ewes and hoggs on Mr Howatson's (Glenbuck) pastures, was 4¼ lbs., whereas in 1875 it was 5½ lbs.; in 1876, notwithstanding the severe season, it was 5¾ lbs., thus showing an increase of 40 per cent. in twelve years. Since 1876 this successful breeder has raised the average yield of wool per ewe and hogg to about 5½ lbs.

Management of Highland Sheep.

Over the immese tracts of mountainland, which constitute a large proportion of the entire area of the United Kingdom, a very efficient system of pastoral farming has prevailed for nearly half a century. As early as the advent of the present century, many flockowners in the south of Scotland had begun to give a considerable amount of attention to the management of mountain pastures, and their good example ultimately extended to the remotest corners of Britain. Generally speaking, every large sheep farm is so situated that one part of it is best adapted

for ewe stock; another portion is more suitable for hoggs; while the more elevated and barren parts are only fit for the rearing of wethers. One of the points of pastoral farming which has hitherto been greatly overlooked, and which is now beginning to claim the well-merited attention of farmers, is the drainage of hill pastures. This is not only the means of removing many dangerous streams, springs, and flat swampy bogs, which usually intersects mountain pasture, but it improves the quality of the grass, and prevents rot and other diseases which are fostered by wet land. Fencing sheep pasture is a practice not very extensively adopted, except on small farms where flocks are confined, and require the constant attention of a shepherd. Boundary fences are common in some parts of Britain, and these prove advantageous. It would be of much service if the practice of enclosing and dividing mountain farms was more generally pursued. It would afford accommodation for separating flocks as occasion required. On farms on which breeding is regularly conducted, parks are specially valuable, though they are not so common as they should be. Besides preventing sheep from straying, they afford special facilities for keeping tups and ewes separate, which becomes necessary at certain seasons of the year, and also for the weaning of lambs.

The southern districts of Scotland claim the honour of raising the best stock, and as being the districts in which the spirit of improvement has been longest and most actively at work. In the counties of Lanark, Ayr, Dumfries, Selkirk, and Mid-Lothian, the greatest pains and attention have been bestowed on the breeding process for a long period. The northern counties, though at one time far behind in their production of stock, have been pulling up within the past twenty or thirty years. Farmers who had previously been groping in the dark, as to the "secrets" of successful breeding, have recently been showing inclinations to vindicate the honour of the Highland fleece. A most active system of (Highland) sheep farming now exists throughout the United Kingdom, and we have no doubt but, "with a long pull, a strong pull, and a pull altogether," farmers will yet acquire a much higher celebrity for their Highland breed. The selection of tups, and the "weeding out" of inferior females from the flocks, are now receiving a considerable measure of that careful attention which these points so strongly demand and so well deserve.

Tups are generally put to the ewes from the 20th to the 30th of November,—according to the situation and character of the farm,—but it is a widely recognised rule on mountain farms that it is much better, both for the mother and the offspring, to have the lambing a little too late rather than too early. In the more northern and inland districts, flocks in the fall of the year

are generally sent to be wintered in the low country or seaboard parts. The character of the winter on the hills is, as a rule, much more severe than in the low arable country, and the system of wintering keeps down the rate of mortality among Highland flocks. About 1860 the average price per head for wintering ranged from 2s. 6d. to 3s. 6d., but since then it has been doubled. Six shillings per animal is a common price now; and if a small extent of turnips is allowed along with pasture, 7s. 6d. or 8s. is sometimes obtained. Two reasons for this great increase in the expense of wintering may be put down thus. The first is, that owing to the increased value of the sheep, owners thereof in upland districts turn more of them to the low country than formerly, in order to get them as well wintered as possible. The second is, that many lowland farmers, who formerly let their winter pasture, now prefer either to keep sheep all the year round, or to buy them in to winter, with a view to sell in spring or through the summer season. Between the years of 1830 and 1840, the cost of wintering sheep was calculated at from 1s. 6d. to 2s. per head. Hoggs are usually put to the wintering ground about the 1st of November and taken home about the 1st of April.

Messrs Kennedy and Grainger, writing in the year 1829, thus compute the profit and loss from a flock of 1000 blackfaced breeding ewes in Inverness-shire:—

126 Ewes, at £9 per score of 21,				£54	0	0
105 Shot lambs, at £2, 10s. per score,				12	10	0
252 Wedder lambs, at £6 „				72	0	0
180 Stones of laid wool, at 5s. per stone,				45	0	0
				£183	10	0
Deductions.						
Smearing,	£25	0	0			
Two shepherds' meal, &c., besides pasturage,	10	0	0			
Interest of money,	35	0	0			
				70	0	0
Remaining for rent and all public burdens,				£113	10	0

"This sum was considerably short of what was wanted for the landlord; and the only resources for the tenant, in order to enable him to make up the deficiency, and keep his family, was the keep of a few cows, and the growth of potatoes, but which, after all, would yield a very unprofitable return for the time employed and the capital invested. The rent, however, is now lowered, and the price of the wool considerably raised." In the southern counties of Scotland the flocks are seldom taken off the lower hills during the winter season. About Christmas the rams are withdrawn from the ewes, and fed upon turnips, hay,

crushed oats, cake, &c. Flocks kept on hill farms during winter require the close attendance of shepherds, particularly during stormy weather. Despite the vigilance of the most trustworthy shepherd, the sheep—having a tendency to crouch in sheltered places, where snow when drifting is sure to accumulate—frequently become embedded in wreaths of snow. Heavy losses are sustained in this manner. One of the most striking characteristics of the blackfaced sheep is its endurance amongst snow. I have seen cases, during my experience of hill-farming, of sheep being buried under a wreath for six or seven consecutive weeks, and coming out alive after a thaw. Frequently, however, after being subjected to such prolonged confinement, they succumb to the elements after being set at liberty. The pasture on hill farms generally gets scant during the winter season, and it is found necesary to supplement the food which flocks gather on the hills by hay, straw, turnips, &c. When farmers send their sheep to be wintered in the low country, they are always careful to place them under the charge of trustworthy and faithful shepherds. For successful sheep farming a careful shepherd is the all-important functionary.

In his description of the qualifications of a mountain shepherd, Mr Little says—"The shepherd should be honest, active, careful, and, above all, calm-tempered. A shepherd who at any time gets into a passion with his sheep, not only occasionally injures them, but acts at great disadvantage both in herding them and working among them. A good-tempered man and a close-mouthed dog will effect the desired object with half the time and trouble that it gives to the hasty passionate man. The qualifications of a shepherd is not to train his dog to running and hounding, but to direct the sheep, according to the nature of the soil and climate, and the situation of the farm, in such a manner as to obtain the greatest quantity of safe and nutritious food at all seasons of the year. Those shepherds who dog and force their flocks, I take to be bad herdsmen for their masters and bad herdsmen for the neighbouring farmers." These remarks are to the point in every sense of the word, and cannot be too frequently impressed upon the minds of both shepherds and masters. At all seasons, interested shepherds can, by care and judgment, do a great deal in improving the condition of flocks.

Most farmers take a quantity of turnips along with lowland pasture during the winter, and when the supply of grass falls short in the first of spring, the sheep are usually netted on the turnips. This is found to encourage the growth and muscular development of young stock. Ewes in lamb are sometimes also allowed a supply of turnips, but if they can be brought through without it there is less danger of mortality at the

lambing season. When ewes, heavy in lamb, are kept upon such nutritious food, the growth of the horns of the male lambs becomes so stimulated as to frequently entail the death of the one or the other, or both ewe and lamb, during lambing. Lambs are often to be seen among Highland flocks as early as the 1st of April, but farmers have been taught some costly lessons in recent years, to guard against early lambing. The hoggs are put to the hills when taken home from the wintering, but breeding ewes are, as a rule, kept on dry ground near the farm steadings or sheep cots, in order that the closest attention can be given them during the critical period. It is customary, when practicable, to give a few turnips to ewes immediately after lambing, and this enriches the supply of milk for the lambs.

Tup lambs are castrated about the end of June, or when they are eight or ten weeks old. Clipping is begun among hoggs about the middle of June, and is generally finished about the second week of July. It is the custom on many farms to wash the sheep before clipping them. In the shearing operation mutual assistance is frequently given. Neighbouring shepherds help each other during the clipping. The sheep are generally branded on the horn or marked with tar or paint at clipping, while some farmers dip them immediately after the fleece is removed. The lambs are allowed to remain with their mothers until the end of July, when weaning begins. At this stage the lambs (but in some cases the wether lambs are not weaned till later on) are separated from the ewes and kept on clean pasture, usually preserved for the occasion, for at least a fortnight, out of hearing of their mothers. Commonly the "weeding out" process takes place at the weaning season, that is the singling out of inferior lambs, or technically speaking "shotts," which are then, or shortly afterwards, disposed of along with "cast" ewes. The age at which ewes become "cast" is, generally speaking, five years, but in exceptional cases they are sent to the market earlier. The prices of "shott" lambs vary from 8s. to 16s., while those of "cast" ewes range from 16s. to 24s. This year (1883) prices were several shillings a head over these sums. These are disposed of at the nearest market. Sheep farmers in the North and West Highlands are largely accommodated for disposing of their summer drafts by the Fort-William and Inverness sheep and wool fairs, and the Muir of Ord markets, while the Falkirk trysts and Lanark fairs are the chief emporiums of southern flockowners. Since so many extensive districts in the Highlands were cleared of men and black cattle and converted into sheep walks, immense flocks of blackfaced sheep—chiefly wethers—are annually disposed of at Doune and Falkirk trysts, and driven into the Lothians and England, where they are fed on turnips. A few flockowners, who have a lowland farm

along with a large range of hill pasture, feed the wedder lambs on the lowland farm instead of selling them at weaning time, and dispose of them in the spring, or through the following summer.

Practically speaking, so soon as the shearing and weaning are over, and the sheep carefully marked, the ewes, lambs, and wethers are divided, if necessary, and disposed of according to the nature of the farm. The old and true proverb, that "shelter is half meat for sheep," is prominently kept in view, and shepherds are watchful to move their flocks to sheltered ground during stormy weather. During the past thirty years the practice of smearing, once so common on hill farms, has been to a great extent abandoned. Some farmers in the north, however, still smear their flocks. The great mass of flockowners prefer to dip their sheep, as will be learned from the opinions of the leading breeders subjoined. It is found to involve less expenditure, and be on the whole more profitable than smearing. Most farmers dip their flocks twice a year. This is regulated by the character of the pasture, whether wet or dry. On very dry pasture one dipping in the year is—at least for old sheep—sufficient. Lambs are generally dipped at weaning time, and again before being sent to the wintering.

Besides the experiments tried with a view to the improvement of the blackfaced breed, some enterprising gentlemen have also made some progress in the direction of improving pasture land by draining and liming, &c. Mr Howatson made an experiment on his property at Dornel, in the parish of Auchinleck, some years ago, which is worth being recorded. He took two farms, which had been previously used for dairying purposes, into his own hands, and having drained and limed them, he put them under a regular breeding stock of blackfaced sheep. After a trial of some eight or nine years, however, the experiment proved unsuccessful and he abandoned it, and let the farms. He found that a sufficient number of sheep could not be kept to consume the grass, without the latter getting too foul from their droppings, and not having a portion of rough pasture to graze upon, the sheep lost a good deal of their hardiness of constitution, which is a very valuable feature of this breed; and, moreover, the sheep stock on such land, was not so remunerative as the dairy cows which had previously been kept upon it. The experiment, however, was not without its value, as showing that the class of land is chosen for each distinctive breed of stock which is best adapted for it. The flocks of this gentlemen are, as I have already indicated, of the highest and purest breeding. He gives and gets long prices for tups annually. In 1870 he sold a tup at £60, and in 1872 he purchased one at £50. Mr Archibald, Overshiels, has, in

recent years, had the distinguished honour of obtaining the highest average prices at the Lothian ram sales. He sold two beautiful specimens to Mr Howatson, at £71 and £58 respectively in 1882.

Smearing versus *Dipping.*

Smearing and dipping, though practically two distinct operations, tend to the same object, viz., the destruction of parasites peculiar to sheep; they also stimulate and improve the quality of wool, and conduce to a healthy and muscular development of the sheep. Smearing is confined for the greater part to the western and northern Highlands of Scotland, but even in these districts it is now less fashionable than it was some ten or fifteen years ago. The advocates of dipping, as a substitute for smearing, have increased in recent years, and the former process is now all but universally preferred in the south of Scotland. The advantages of dipping are undoubted, but they are by no means best exemplified in its effects upon wool. The strength of its utility lies more in its efficacy in destroying keds and all vermin peculiar to sheep. To dipping, some people prefer pouring with oil, butter, and turpentine for hill stock on lowland farms. Smearing entails more labour than dipping or pouring, and is consequently more expensive. The process is so elaborate that a man can only smear about a score of sheep per day. The wool has to be parted at a distance of about two inches, and the composition inserted to the skin in each "shed" with the fingers. The smearing composition usually consists of Archangel tar, butter, American grease, brown grease, and palm oil. A dip, consisting of a combination of oil and grease, has been considerably used during the past ten or fifteen years. Smearing is recommended for flocks on the Grampians and Monaliadh ranges, and the highest parts of the counties of Argyll and Ross. In respect of the extent to which dipping and smearing are used, the former undeniably bears the palm. Though the latter process might be considered more suitable than dipping for certain climates and situations, its cost is nearly three times that of dipping; and in view of the present condition of the sheep and wool markets, such an expenditure is considered by many entirely unnecessary, and is being abandoned accordingly.

The following is a comparative statement of the price per pound of white and laid Highland wool at different periods since 1841:—

	Laid Wool.		White Wool.			Laid Wool.		White Wool.	
	s.	*d.*	*s.*	*d.*		*s.*	*d.*	*s.*	*d.*
1841,	0	4	0	$3\frac{3}{4}$	1872,	0	10	1	3
1843,	0	3	0	$4\frac{1}{3}$	1876,	0	6	0	$8\frac{1}{2}$
1860,	0	$5\frac{1}{2}$	0	$8\frac{1}{2}$	1880,	0	$5\frac{1}{2}$	0	8
1868,	0	$4\frac{1}{2}$	0	$6\frac{1}{2}$	1883,	0	4	0	$5\frac{3}{4}$

Besides the labour which smearing involves, it depreciates the value of the wool very considerably, and gives rise to the question, whether the benefit which the sheep derives from smearing is equivalent to the sacrifice in the price of the fleece by its application? The average yield of wool from smeared and dipped sheep is as nearly as possible thus: *Smeared*—wethers, 6 lbs. to 7 lbs.; ewes, 3½ lbs. to 5 lbs.; and hoggs, 4 lbs. to 5 lbs. *Dipped*—wethers, 3½ lbs. to 5 lbs.; ewes, 2½ lbs. to 4 lbs.; and hoggs, 3 lbs. to 4 lbs. These figures show that to make up for the reduction in the value of laid or smeared wool, there is an increase in the yield or weight of the fleece over that of white wool. But out of this has to come the wages of the smearer and the cost of smearing materials, which together cannot be less than 8d. per head. Dipping is calculated to cost from 2d to 3d. per animal.

An important and noteworthy fact in favour of the dipping theory is this, that white ewes, *i.e.* dipped, or poured, keep their lambs better than laid ewes. In proof of this an experiment was tried on the farm of Biallid, near Kingussie, in 1861, by Mr Stewart. The ewe stock was 2000, 1000 of which were laid with tar and butter and 1000 poured with—

8 lbs. Tobacco juice,
6 „ Hellebore,
4 „ Soft soap,
½ „ Arsenic,
} for 100 sheep.

The whole of these ewes were grazed indiscriminately over the farm. It was a bad winter, and worse spring; and lambs were rather a short crop, and as follows:—

Poured ewes,	. .	782 lambs
Laid do.,	. . .	702 do.
		80 at say 10s. = £40

in favour of the white ewes. This result most clearly demonstrates that the white ewes invariably yield the largest crop of lambs.

The subjoined list of dipping material is found to make a very servicable bath for 100 sheep:—

30 lbs. of Grease butter.
14 „ Rough turpentine.
3 „ Soft soap.
2 „ Soda.
6 bottles of Spirit of tar.
45 to 50 bottles of Water.

Hints for the Improvement of the Breed.

How can this mountain breed be improved and increased in value without detracting from its natural hardihood and

general independent bearing? This question has perplexed the minds of people engaged in pastoral pursuits for the greater part of a century, but their past experience has now led to a practical solution of the problem. With a slight modification of the rough character of the Highland wool, which has already been effected in some parts of the country, it cannot be doubted that the blackfaced breed will hold its own, at all times, against all the other varieties of sheep. It is now universally admitted that the only means by which this breed of sheep can be improved or enhanced in value, is by judicious selection and careful breeding; and with a view to encourage and if possible assist flockowners in effecting the desired object, I subjoin a few suggestions which, if carried into effect, I have no doubt will answer the design for which they have been written:—

1. Select the best woolled tups and ewes of the blackfaced breed, possessing the most fashionable type—which I have previously described—of bodies, heads, and horns, from flocks which are known to contain blood of the purest description, but avoid in-and-in breeding.

2. Having selected say, five, ten, or twenty ewes, which come nearest ideal perfection, mate them with tups coming as nearly as possible to the standard of excellence in every point.

3. Care should be taken that these and their produce be not allowed to pasture among the ordinary hill stock.

4. Care should be taken that the female progeny of the first selected lot be not allowed to come in contact with the tups until they are at least eighteen months old, at which time another tup will require to be selected, but not from the same source as the sire or dam of the gimmers had come.

5. This practice of getting a new tup for each succeeding race should be adopted until the flock would increase so as to permit a portion of the gimmers being sold. All inferior gimmers should be disposed of every year, as should also the whole of the ram lambs.

6. It is specially important that the pasture should never be overstocked, that the ewes should be kept in good condition during winter, and that the lambs should not be allowed to fall off in condition during and after the weaning season.

Appendix.

Mr Howatson of Glenbuck gives it as his opinion, that the blackfaced sheep are increasing in number, and are deservedly becoming more popular throughout Scotland every year. The average yield of wool per animal on his farm is $5\frac{1}{2}$ lbs. per hogg and ewe. It is a great mistake, says Mr Howatson, to smear sheep; it should never be done, and no good farmer will persist

in doing it. He dips his sheep twice a year, at a cost of about 6d. per head. The only way in which he considers the wool of the blackfaced sheep could be improved is by procuring the best blood for breeding purposes.

Mr James Archibald, Overshiels, Stow, says blackfaced sheep farming is now more extensively pursued than it was ten or twelve years ago. Cheviots were then the favourite breed in many districts, but in consequence of the very great reduction in the price of wool, combined with the effects of the recent bad years, that breed has greatly depreciated in the estimation of sheep farmers. It is actually dying out and giving place to the hardier blackfaced race.

Writing to us on the same subject, Mr James Greenshields, West Town, Lesmahagow, says—"Between thirty-five or forty years ago the blackfaced sheep were very much supplanted by Cheviots, but a reaction has again taken place, and the blackfaced breed is rapidly being re-established. As early as the first of the present century, almost every flock of blackfaced sheep was smeared, but now smearing is all but unknown. In this district the yield of wool per ewe is from 5 lbs. to 6½ lbs., the yield per hogg being 1 lb. more, which is about the average of other southern districts. Smearing cannot be done at anything less than 8d. per head." Mr Greenshields has tried some experiments in the crossing of the blackfaced with other breeds. He has used Yorkshire, Lincolnshire, and Border Leicester tups to blackfaced ewes with little success. He preferred the produce of the Leicester tup, however, to that of any of the others, as they matured more rapidly, were earlier ready for market, and fed on scantier fare.

In this district, says Mr Aitken, Listonshiels, and in the south of Scotland generally, sheep farming is far more extensively pursued than it was fifty years ago. Blackfaced sheep have been increasing in popularity during the past quarter of a century. Their fine hardy constitution enables them to withstand the severity of the winter and backward summers better than any other breed. The Cheviot and other breeds are dying out in Scotland. There is most money to be taken out of blackfaced sheep when properly managed, and in recent years blackfaced sheep farming has been more remunerative than in earlier periods. South country farmers have become alive to this fact, and more attention is now being bestowed on the breeding and rearing of young stock. The average clip on Mr Aitken's farm is 5½ lbs. per animal. Smearing is not practised in his neighbourhood. He dips his sheep once a year, either in the month of February or October. His lambs are always dipped at weaning time. The cost of dipping is about 13s. per 100 sheep, or 2d. per head. On soft grassy pasture the quality of wool is always better than on hard heathery land, but there is great

room for improvement in any case. It cannot be improved, however, by crossing the blackfaced with other breeds, without impairing the hardiness and natural characteristics of the Highland breed. The tups used on all kinds of pasture should have strong shaggy coats, entirely free from "kemps." The wool must not be short and curly, but, on the contrary, long and straight in the staple. Mr Aitken considers that the best way to improve the wool of the Highland breed is to select the best ewes, whether deficient or not in wool, and mating them with good hardy well-bred tups. This invariably gives rise to a stock of capitally woolled lambs. Crossing blackfaced sheep with other breeds, says Mr Aitken, has always a detrimental effect, and after introducing strange blood into a flock, it is several years before it can be reduced to a state of purity.

Mr J. Moffat, Gateside, Sanquhar, Dumfriesshire, says—"Blackfaced sheep at one time, within the past thirty years, threatened extinction by the growing interest shown in the Cheviot breed, but winters have been so severe in recent years, that the mortality amongst the latter mentioned variety has been so great as to necessitate restocking of farms with the blackfaced or heath breed, whose hardihood is better calculated to withstand rigorous climates. In this part of the country it is now threatening to be overdone." Sheep farming, says Mr Moffat, could be made to pay better by increased liberality on the part of the landlord in renting farms. The average yield of wool per animal in this district is about 5 lbs. Mr Moffat holds that there is no profit in smearing sheep, but on farms where this is practised the average outlay per head is about 9d. He dips his own flock twice a year, using arsenic and carbolic acid, which cost about 4s. per 100 sheep.

A gentleman who has been singularly successful in improving the quality of the wool of his large and superior flock of blackfaced sheep is Mr Robert Buchanan, Killearn. He has also by careful attention greatly raised the character of his flock; and besides having won many distinguished prizes in agricultural shows, he has obtained high prices for his shearling tups. Not later than the month of June last, he sold a lot of shearling tups to Mr Malcolm of Poltalloch, Argyllshire, at £20 each. The only means, he says, of improving the type of the blackfaced sheep is by careful selection from the best stocks, and he would suggest the following as the points which a good sheep should possess:—Strong bone, a good face, well laid-in shoulder, well set on nice short legs, wool free from "kemps," and coarse hair. He has during the present year (1883) sold hoggets about eleven months old at 51s., and he says 45s. is quite a common price when well fed on turnips and grain. These are extensively bought in by low country farmers to feed instead of crosses, as they cost generally about 10s. a head less than greyfaced lambs.

There has been no smearing in this part of the county, says Mr Buchanan, for the last twenty years. As a general rule, it is found that dipping answers equally as well as smearing, and is much cheaper. Dipping can be performed with half a pound of grease at say 3d., and dip and men's wages, say 2d.—5d. in all for each animal; while smearing would cost as much as 1s. a head. He dips his lambs at weaning time, and again at the 1st of November, when sending them away to the wintering. Hill ewes are dipped once a year, generally in the end of October.

Mr William Whyte, Spott, Kirriemuir, corroborates the remarks of other authorities regarding the popularity of the breed, and mentions the counties of Lanark, Dumfries, Ross, and Inverness specially in which the Cheviot breed is being supplanted by blackfaced sheep. The amount of sheep pasture, however, says Mr Whyte, which has been put under deer has greatly curtailed the extent of sheep farming. It has not been paying so well as could be desired of late, owing to the low price of wool and the cost of wintering. The latter expense has been doubled within the past thirty years. Wool is selling at half what it realised some twelve years ago. The clip of well-wintered wethers averages from 5 lbs. to 7 lbs., while that of ewes is from 4 lbs. to 5 lbs. Smearing is not practised in this county. Mr Whyte dips his lambs when they are weaned in August, and again in the 1st of October before sending them away to the wintering. The wool of the blackfaced sheep, Mr Whyte continues, can only be improved by selecting fine woolled tups of the same breed, without tampering with crossing. Crossing might be the means of temporarily improving the wool, but thereby the type and hardiness of the sheep would be destroyed.

Mr Gordon, Udale, Invergordon, concludes that the most efficient way to secure and conserve the best qualities of the blackfaced sheep, as well as to eradicate its defects in a proper and satisfactory manner, is by careful and judicious selection. He has tried various crosses, and bred them back to the pure heath breed again, but without success. The tups used in crossing were those of the Leicester, Lincoln, and Cheviot breeds, and of what is known as the improved Lincoln tup, threw the best progeny as regards the quality of wool and flavour of mutton. The blackfaced breed of sheep, says Mr Gordon, has always been popular in the central and western counties of Scotland, and even in the counties of Sutherland, Ross, and Inverness, where, about the beginning of the present century, it was almost entirely superseded by the Cheviot breed; it is again predominant, and has increased greatly since the heavy mortality among sheep stocks during the severe winters of 1859–60, 1878–79, and 1880–81.

Mr D. M'Arthur, Elmpark, Helensburgh, a retired sheep

farmer, who had long experience in the breeding and rearing of blackfaced sheep, concurs with the remarks of other gentlemen previously given generally, and adds that by the present laws he does not see how sheep farming could be made to pay better, except by reducing rents and fencing hill pasture. The average yield of wool for three-year-old wethers dipped with grease, is about 7 lbs., that of milk ewes 4 lbs., and that of hoggs 5 lbs. a head. Dipping with about half a pound of grease for each animal costs in all about 5d. a head.

Regarding these latter two points, Mr Samuel Davidson, manager to Lord Tweedmouth at Guisachan, states that the usual yield of blackfaced wool per animal is 6 lbs. white wool and 8 lbs. laid wool. It is not profitable, says Mr Davidson, to smear sheep, on account of the high price of smearing materials, men's wages, and the low price of laid wool. Smearing costs on an average from 10d. to 1s. per head. Dipping, says Mr Davidson, is preferable to smearing. It has generally to be performed twice a year, each dip costing about 2d. per animal.

THE BLACKFACED BREED OF SHEEP.

By David Archibald, Awamoa, Otago.

[*Premium—Five Sovereigns.*]

There can be few more interesting subjects to breeders in Scotland than the breeding of the blackfaced sheep. These hardy animals have now gained a place and reputation for themselves that will entitle them to claim notice and attention. The breed may indeed be said to be at present the mainstay of Scottish sheep farming, as they were in the first instance largely the means of developing the pastoral resources of the country. In reference to their origin there is a good deal of uncertainty. Theories to account for it are, however, plentiful enough. To begin with, there is the usual story that they came from Spain with the Armada—a story which seems to be told about nearly all wool-bearing animals whose descent it is difficult to trace. A second tradition is, that they were introduced by one of the Scotch kings (whom Hogg calls James IV.) into Ettrick forest; but the quarter from which they were supposed to have come is a point on which this narrative is altogether silent. Another belief, which has attracted more attention than these, is that the blackfaced breed were originally the product of a cross between the goat and the old whitefaced native sheep. This is an opinion which was at one time pretty current, and is found mentioned in the works of several writers. The publication which gave most importance to it was perhaps the Old Statistical Account of Scotland. The reference to the subject occurs in the report

on the parish of Urr by the Rev. James Muirhead. This writer, after pointing out "that in the reign of James VI. Galloway was understood" to produce the finest wool in Scotland, perhaps in Britain, fixes the date of the introduction of the blackfaced as about the time the king left Scotland for England (in 1603), and then asks, "Whence these sheep came?" "It may be observed," he says, "that Galloway abounds with goats, which in the marshy or soft tracts are almost uniformly of a black colour;" and then he gives some countenance to the theory that the goats and sheep bred together, mentioning that mongrels or crosses between the two animals were quite common. But while he ventures on this suggestion, Muirhead confesses that any inquiry upon the subject is not attended with much satisfaction. Then again, another and more widely accepted opinion has been, that the breed travelled northward from Yorkshire. This hypothesis was brought forward by Marshall, the author of numerous agricultural works at the end of last century. There is, however, this objection to accepting Marshall's authority, that in two separate works, published within a few years of one another, he makes statements that are slightly at variance. In a work on the *Rural Economy of Yorkshire*, published in 1788, in speaking of the moorland sheep, he says they "are probably of Scotch origin," adding that "they resemble much the Scotch sheep which are sometimes brought into the vale." Six years afterwards Marshall must have had but an indistinct recollection of what he had written in 1788. In an essay published in 1794, on the agriculture of the central Highlands of Scotland, he states "that the breed, which is now supplanting the ancient breed of the Highlands, is that which is well known in Scotland by the name of the blackfaced breed, which on the southern hills, as well as in the highlands or mountains of Braemar, is the established breed." Then, in dealing with the question of the origin of the breed, he gives altogether vague testimony. "Whether this breed has heretofore travelled northwards from the moorlands of Yorkshire, where a similar breed has been so long established as to be deemed natural to a heathy or mountainous situation, or whether that breed was drawn originally from Scotland, might perhaps be easily traced upon the southern borders." Further examination of the recorded opinion of many writers leads to no more satisfactory result. So much is dependent on conjecture, that it is quite impossible to form any definite opinion based on reliable grounds. This view is fortified by the position taken up by two writers whose opinion carries considerable weight. Naismyth of Hamilton, writing in Young's *Annals of Agriculture*, in 1796, descriptive of a visit he had made to Lammermuir, states that the breed prevalent there was "the blackfaced muir kind, having generally horns, and called the short sheep," but that "it is impossible to trace their origin,

there being no traditions of the sheep here being of a different kind, nor can they be called a distinct variety of the species." A passage very similar to this occurs in a *Report on the Agriculture of Peebles*, written by the Rev. Mr Findlater in 1802. "There seems to be," this writer says, "no clear tradition nor even plausible conjecture as to when or whence sheep were first introduced into this country, or whether the present breed are indigenous or from another country. There is, indeed, an obscure tradition, that previous to the introduction or general prevalence of sheep in the parish of Tweedsmuir, the farmers in that parish paid their rents by grazing, for hire through summer, the oxen then generally used by Lothian farmers for their winter ploughing. The native Tweeddale breed, which has continued the same as far back as memory or tradition extends, are all horned, with black faces and black legs and coarse wool." While there is much uncertainty in connection with the origin of the breed, it is beyond doubt that the system of sheep farming began to grow in importance just at the time when blackfaced stock began to grow into a prevalent type. Napier, in his work on *Store Farming*, which bears the date of 1822, adopts this view. "The present system of sheep or store farming does not appear," he writes, "to have taken place till about the end of the reign of James VI.," a statement which it may be pointed out agrees with what Muirhead says in the Old Statistical Account. "Before this time," Napier explains, "the mountainous south country districts are said to have been under a stock of black cattle and some small straggling flocks of sheep, as was the case in the Highlands till of late years." It is quite in accordance with this opinion, that it is ascertained that nearly two centuries ago a breed, which was known as the Linton sheep, had established themselves pretty firmly in the south of Scotland. These sheep were also called the Forest, the Tweeddale, or the Lammermuir breed, according to the district in which they were found,—there being, however, no difference among them except in name,—and were most widely spoken of as the Linton breed, because of that village in Peeblesshire being the principal market for them, and a very important market it at one time was, as is indicated by the fact mentioned by Mr Thomas Johnston, in his *General Review of the Agriculture of the County of Tweeddale*, "that as many as 9000 were sometimes sold in one day," in the beginning of the eighteenth century. This then is the view that it seems best to take. The origin of the breed is uncertain. Though the quotations that have been made from old writers are all interesting, their authority is not convincing. As to the character of the breed, when it first came prominently into notice, there is, on the other hand, no dubiety. Descriptions of their appearance are numerous and minute, and on the testimony of different chroniclers there is fortunately no

puzzling diversity. The sheep are universally described as having black faces and legs—hence, of course, their name. In regard to weight, it is more difficult to get at the truth, in consequence of the eccentricities of the old Scotch scales, in connection with which nearly every county has a law unto itself. But still some reliable information is obtained from Nasmyth, who, as has been said, himself made a tour of personal inspection in the Lammermuir district in the year 1796. In this man's writings it is stated that "sometimes a fallow or eild ewe from the hill, killed, weighs from 9 to 10 lbs. avoirdupois per quarter." With reference to the fleeces, Nasmyth also gives us some light, in availing one's self of which it must, however, be borne in mind that the practice of smearing was everywhere followed. The statement he makes is that "eight hogg fleeces, nine ewe fleeces, or six wedder fleeces, make a stone of 24 lbs. avoirdupois." Nor does the clip appear to have been any heavier in other districts. In an article on the "Sheep System on the Moors of Lesmahagow Douglas, Moorkirk, &c.," he states, "from 6 to 7 fleeces make a stone; the wool is not washed before shearing;" and then he adds, "salving is general, and in the central parts of the county the tar is very grossly laid on, with very little mixture of butter." "The length of the staple," he says, referring to the Lammermuir district, in a way that implies that he was writing just before shearing time, "is from 4 to 5 inches long." One fact which it is not unimportant to note, is that there was much more black hair in the wool then than there is now. "The lambs," Nasmyth says,—and in this he is corroborated by several other writers,—"are mostly white, but some have black spots on different parts of the body, and one perhaps in thirty-six is black all over." As to their general appearance, when we come down as far as the beginning of the present century, we find it related in the *Farmer's Magazine* that the points of a good ram are "long and well-turned horns, a long black face, forehead rough and slightly tinged with brown, jaws straight and long, nose long, and nostrils wide."

A highly interesting chapter in the history of the blackfaced is that connected with their introduction to the Highlands. There they were by no means universally welcomed. A small white breed, celebrated for the fineness of their wool, were found in possession; and the admirers of these animals mourned loudly over the inroads of the hardy blackfaced. One of the loudest of these mourners was Dr James Anderson, who, writing in 1790 to the Highland Society, relative to the improvement of wool in the northern counties, says, "the coarse-woolled sheep have been debasing the breed (meaning the old breed), under the name of improving it, so that I am inclined to believe that in the mainland of Scotland the true unmixed breed is irrecoverably lost." In another passage, Dr Anderson gave it as his

opinion, that if the original breed still existed anywhere entirely unmixed, it was in the Shetland isles. In connection with this reference to Shetland, it may not be out of place to mention a curious fact related by Sir John Sinclair, in his work on the northern counties of Scotland, published in 1795. "It is now pretty clearly ascertained," Sir John says, "that the celebrated Shetland breed of sheep came originally from Denmark and Norway, along with the first adventurers who settled in these islands some centuries ago. A young sheep from Randers, in Jutland, was presented to Sir John Sinclair by Mr Gladstone, merchant at Leith, and was found to be exactly similar to the sheep of Shetland." This passage has suggested to some that possibly the old whitefaced Scottish sheep was a similar animal to that which was formerly common in all the northern countries of Europe. This opinion receives no countenance in an account given by Marshall of the central Highlands. "Formerly," he writes," and I believe from time immemorial, the Highlands and the entire north of Scotland were stocked with a race of sheep almost as different from those of the southern provinces as goats and deer are from the ancient breed, whose fur consisted of a sort of down, overtopped by long straight rigid hair, somewhat like the coat of the beaver and other furred animals; widely different from the wool of European sheep in general. And besides this distinction of coat, there is another characteristic difference which marks them still more strongly. The tail, which in all varieties of woolled sheep is long and all covered with wool, resembling that of the rest of the body, is, in the animal under notice, short, slender, tapering, and thinly covered with strong silvery hairs, and not exceeding in size that of the deer or the goat. Its face, too, is covered with sleek hairs, as that of the deer; and, like this, it has the eyes prominent."

A more flattering description of the breed is found in the survey of Aberdeenshire produced by Dr Keith. On the fineness of the wool this writer has a good deal to say. "Their wool," he states, "though deficient in point of length and quantity, was of most excellent quality, and not inferior to any Spanish wool. Stockings made from it were worn by persons of the first rank in Britain, and exported to the Continent at very high prices. One lady belonging to this county knitted them of so fine texture that they were sold at three guineas a pair, and several of them were commissioned for by the Empress of Russia. They were so fine that a pair of them could have been drawn through a ring that was taken off the finger of the fair manufacturer."

Of this much-lamented breed there is now absolutely no trace among the large Highland flocks. They not only disappeared before the blackfaced, but they disappeared without having engrafted any of their characteristics upon the new comers. They have, in fact, simply died out under the pressure of a

stronger and a more aggressive breed. The first appearance of the blackfaced in the Highlands dates back about one hundred and twenty years. They are traced in the first instance to Perthshire and Dumbartonshire, from which counties they crept gradually northwards till in the extreme northern counties their colonisation was checked by the Cheviots, on whose side the influence of Sir John Sinclair was strongly cast. In reference to Perthshire, Robertson, the minister of Callander, who writes an account of the county at the beginning of the century, states that about forty years before he wrote, "the blackfaced or mountain breed were introduced from the south." In a *Report on Dumbartonshire*, published about the same time as Perthshire, compiled by the Rev. Andrew Whyte and the Rev. Dr Macfarlane, it is mentioned that the blackfaced sheep were brought originally from the counties of Dumfries and Lanark, and were introduced there about 1750. Argyllshire, too, claimed about the same time. In the *Farmer's Magazine* there is mention made of Mr John Campbell of Lagwine, "who was certainly the first who banished cattle from the West Highland hills, and supplied their place with blackfaced muir sheep from his native place."

Mr Campbell, we are told, was at one time a proprietor of Garieve, Ayrshire, but misfortune came upon him about the year 1755 or 1756, and he then "set off for the West Highlands, and leased the extensive farm of Glenvoe, part of the Ardkinless estate." From Perthshire the sheep were taken to the north by Sir John Lockhart Ross of Balnagowan. About their fitness for the hills there was from the outset no doubt. The climate was trying, but their hardiness was equal to it. Thus, in Mackenzie's *Review of Ross and Cromarty*, the writer narrates how in travelling through the Highland districts of Perthshire he observed "the blackfaced or Linton breed of sheep were kept exposed to the severest winters by the farmers in that county, and were far more profitable stock than black cattle."

Within recent years blackfaced sheep have improved very much in character. In the first place, they have had a sharp tussle with the Cheviots, and this no doubt has had the effect of putting breeders on their mettle. The encroachments of the whitefaced sheep on the ground of the blackfaced went on almost uninterruptedly until the disastrous season of 1860, when the difference between the two breeds was very marked—the Cheviots suffering severely, while the others escaped nearly untouched. Then the tide of favour began to flow for the blackfaced. Farmers in high-lying districts changed back to their old stock, while on ground which Cheviots had always had to themselves the hardier type took their place. This transition is still going on, stimulated greatly by the trying seasons that have been so common of late, and also no doubt by the consideration that the difference in the value of the wool of the two breeds is

not nearly so great as it formerly was. The sheep, as has been said, have improved in appearance just as they have grown in popularity. Excepting the stocks of one or two breeders, they were, within so recent a date as twenty years ago, sheep with narrow frames and very little symmetry, now they are generally well-proportioned and wide-ribbed. In nothing have they altered more than in the styles in which they are set upon their legs. In carcass and wool they have increased materially. A common clip in former times seems to have been, as has been pointed out, about 3 lbs. overhead in a general ewe and hogg stock. At present a common clip is 4½ lbs., while in some cases the average is as high as 5 or 6 lbs. The staple of the wool has increased in even greater proportion. Formerly the length was usually from 4 to 5 inches; now it runs from 9 to 10 inches, and it has been known occasionally to be as much as 15 inches. The weight of the carcass has increased to such an extent that eild ewes on good farms commonly average from 15 to 16 lbs. a quarter, while in the best stocks they are sometimes equal to 20 lbs. From this it will be seen that both wool and carcass now give a better return by at least 40 per cent. than formerly.

In tracing the history of the breed from the time when they became common over the country, the first mention found of a breeder who appears to have attained eminence is that of David Dun of Kirkton, whom the statistical writer for the parish of Campsie says "has been with some propriety styled the Scotch Bakewell." Dun farmed what is described as pasture ground, on the muirlands of the estate of Kirkton lands, which it may be mentioned is now part of the farm of Knowehead, in the occupancy of Messrs Foyer. In the Statistical Account of 1795, he is described as having the best stock of blackfaced ewes that are to be met with in Scotland. "They are," it is stated, "completely muir ewes" (which simply means blackfaced), and yet they weigh 12 lbs. per quarter, 22½ ounces to the lb., or nearly 17 lbs. imperial per quarter. They are sold at a guinea a head when fed. This breeder is also mentioned, in an account given of the parish of Fintry, as a man "whose exertions in improving the mode of grazing are truly laudable, and to whose example its present advanced state, through a considerable part of the west of Scotland, is in a great measure owing." Some indication is given of the extent of the trade carried on by Dun. From this account it does not seem to have been a trade that would have counted as anything worth notice at the present time. "He annually sells," it is stated, "about 60 tup lambs of a year old, for which he never receives less than a guinea each, and his lambs for killing at annual sales in May at half a guinea each." Dun, it may be added, was killed in 1794 by an accident which happened to him while he was among his flock attending to their shearing. He was leading a sheep across a bridge; the

rail of the bridge gave way, and falling, he was killed upon the spot. While Dun's reputation was at its best, the sheep in the parish of Douglas, in Lanarkshire, obtained some distinction, without however having so good a claim to it. This is learned from the Statistical Account, which says, "the sheep in Douglas parish are superior to those of the neighbouring parishes." Their weight is given at from 7 to 10 lbs. per quarter Dutch, very much less than Dun's. Coming down to the present century, the principal breeders in the early part of it are found to be Mr Welsh, Earlshaugh; Mr Weir, Priesthill; Mr Gillespie, Douglas Mill; Mr Robertson, Broomlea; Mr M'Kersie, Glenbuck; and Mr Foyer, Knowehead, the grandfather of the present tenants. All these men lived about the same time half a century ago. About twenty to thirty years ago the most important breeders were the late Mr Foyer, Knowehead; Mr Watson, Nisbet; Mr Watson, Mitchellhill; Mr Craig, Craigdarroch; Mr Dryfe, Barr; Mr Murray, Eastside; Mr Miligan, Kirkhope; Mr Sandilands, Cummerhead; and Mr M'Kersie, Glenbuck. In more recent years, the stocks which have taken the lead have been those of Mr Archibald, Overshiels; Mr Foyer, Knowehead; Mr Craig, Craigdarroch; Mr Aitken, Listonshiels; Mr Brydon, Burncastle; Mr Craig, Southhalls; Mr Fleming, Ploughlands; Mr Greenshields, West Town; Mr Sloan, Barnhill; Mr Howatson of Glenbuck; Mr Watson, Culterallers; Mr Melrose, Westloch; Mr Moffat, Gateside; Mr Robertson, Achilty; Mr Malcolm of Poltalloch; Mr Coubrough, Blairtumnock; and Mr Buchanan, Letter.

For the sale of blackfaced sheep, the market held at West Linton, in the end of June, continued the most important in Scotland till 1857, when it was transferred to Lanark, where blackfaced ewes and wedder hoggs are still largely represented; but for tups it has been entirely superseded by the autumn ram sales, the most important of which are Edinburgh, Perth, and Ayr,—the sale at Edinburgh being established as the Lothian Ram Society in 1864. It is at Edinburgh that the highest prices are obtained. Till 1871 the trade remained at a comparatively low level. In this year, however, prices made a decided spring, Mr Greenshields averaging £12 for a lot of 46, and Mr Aitken, Listonshiels, £11, 2s. 6d. for a lot of 50. In 1872 the highest prices were those of the Overshiels sheep, which averaged £9, 14s., while the next were Mr Brydon's, at £9, 2s. 6d. Since that year Mr Archibald has always realised the highest prices, except in 1875. The highest prices yet obtained were those of last year (1882), when the Overshiels lot averaged £16, 12s. 11d. The largest figure ever given for a single tup was £71, which was paid by Mr Howatson in 1881 for one of Mr Archibald's lot.

In an essay of this kind it is not necessary to go into minute

details of management, but merely to give a short outline of the general principles.

Throughout the south of Scotland, the method of management varies very little. There, as a rule, it is a ewe stock that alone is kept. Between the northern and southern counties there is, however, a considerable difference. In the first place the Highland farms are mostly under a mixed ewe and wether stock; then again the practice of wintering makes an important distinction between the two parts of the country. In the south nearly all the sheep are wintered on the farm. To this rule the principal exception is the case of the south-western counties, where the practice is to send away the hoggs to winter on the dairy farms in the low-lying districts. The Highland farmer, on the other hand, is compelled to winter away all his hoggs, and sometimes part of the one-year-old sheep as well. The routine of the year's management may briefly be described, —taking first the south. A fit time to begin the season's work is with the sale of the cast ewes in October, which are generally drafted when six years old. Formerly it was the almost universal practice to sell these sheep by the clad score; but this custom has of late been disappearing, owing to the popularity of auction marts. The price generally realised by this class of stock has been in past years about 26s., but during this and last autumn they have reached the extraordinary price of from 35s. to 40s. The purpose to which they are generally put is one for which they are admirably adapted. This is the production of what are known as greyfaced lambs. The ewes, after being bought by the lowland farmer, are crossed for one year with a Leicester or some other long-woolled tup. Where the land is not suitable for bringing the lambs into the fat market, they are kept on, and brought out as hoggs in the following year. One characteristic of these ewes and their progeny, which tended greatly to popularise them, is their hardiness. This enables them to winter on rough ground without turnips or artificial feeding. In these days, when cultivation has been paying so badly, the inducement to farmers to give increased attention to this mode of adding to the resources of the farm has been very considerable, and it is therefore not surprising that the blackfaced trade has been materially benefited. The localities to which the ewes usually go are the northern counties of England, and the districts of Scotland where the pastures are not "stormed with snow," and where sheep can pick their way through the winter.

When the cast ewes have been put away, attention is generally turned to the dipping, though, as with Cheviots, it may be questioned whether it is not better to delay this operation till January or February. The dip that can be most recommended is a mixture that may easily be prepared by any farmer. The

ingredients are—1 gallon of soluble carbolic acid added to about 90 gallons of water, 2 lbs. arsenic, mixed with the foregoing after having been dissolved in a slow boil in two or three gallons of water, and 4 lbs. of pearl ash or washing soda. With this mixture sheep can be dipped at a cost of 2s. 6d. per 100. To those who object to the use of arsenic, if a half gallon of carbolic is substituted, it will be found quite effectual. The practice of smearing has almost died out. After dipping, where this is done at the old time, immediately comes the marking of the stock and the checking of the numbers. Then, this over, the tups are put to the ewes on the 22nd November. The number of ewes given to one tup is usually three score. It is advisable, it may be said, to draw out some of the best ewes to a select tup. This practice has hitherto been far too seldom adopted among blackfaced sheep, and breeders would do well to give more attention to it. The tups are brought away from the ewes about the 1st of January. Wintering in the south is, as has been pointed out, a very simple matter. Occasionally, in trying seasons, there is no course except to give the sheep a little hay; but this the blackfaced require rarely, in comparison with the Cheviots, which are much less self-reliant and active. During lambing, which is the next business on hand, the ewes, which begin to drop about the 17th April,—a few days prior to which they should have all been udder-locked,—need much less assistance than any other breeds from the shepherd. A great ease in lambing is no doubt partly due to the care which has been given to shape of the horn, for since farmers began to show preference for sheep with horns that lie slightly back instead of the forward horned kind, the ewes appear even more easily managed than formerly. Another thing that takes a weight off the shepherd's mind is that the mothers are generally better milkers than the Cheviots, while the lambs are so much more hardy, that even with no better nursing they would manage to live, while Cheviots would succumb. Twins are not regarded as an advantage, except where there are parks for them, or where they are of service in "beating up" deaths. Of tup eild sheep there are fewer than among Cheviots. The castration of the lambs—after those to be kept as tups have been selected—takes place at the end of June, unless where the stock are intended for the fat market, in which case it is done a fortnight or three weeks earlier. It was the custom at one time to wash blackfaced sheep, but within the last twenty years the practice has been discontinued. Clipping begins about the 10th July. Blackfaced, like all other classes of wool, has suffered from the recent depression, but not to the same extent as Cheviot and some of the finer kinds,—the reason being perhaps partly the original lowness of price, and partly the improvement that has taken place in the quality and length of staple, long deep wool

commanding the highest price. A fairly remunerative price may be said to be 18s. per stone of 24 lbs. The prevalent price of late has been from 12s. to 14s. The lambs are weaned at two different times—the wedders at the beginning of August, and the ewes a fortnight later. For both kinds the principal market is at Lanark, the one fair being held a fortnight later than the other. For wether lambs a satisfactory price is from 15s. to 18s. Before being marketed the ewe lambs are drawn, the best are retained for the maintenance of the stock; and the seconds, which are not required for this purpose, are sold. Of late years the demand for these lambs has been very brisk, in consequence of their popularity for crossing purposes, and also of the desire to substitute them for Cheviots. They have therefore commanded good prices, and from 22s. to 24s. has been a figure very commonly paid for them. This brings the round of the year to a close.

In the south, it may be added, rents average about 7s. or 8s. per head, where the hoggs are reckoned as part of the holding. This rent may be said to be largely the growth of recent years. In proof of this, it may be mentioned that in a *General View of Berwickshire,* written in 1794 by Alexander Lowe, it is stated that thirty or forty years before that date a common rent was 1s. 6d. per head, and that this figure had risen first to 2s. 6d. and then to 4s. 6d. In the north the management differs from that just described, inasmuch as is the necessary result of the stock being partly ewes and partly wethers. The sales from a Highland farm embrace the wethers, which are usually disposed of when three years old, and the draft ewes, which are sold at the same age as in the south. The principal markets for these are Inverness in July, and Perth sales and Falkirk tryst in October. In addition to these sales, there is of course the wool. Smearing is still followed by a number of farmers in these districts. The believers in this practice are, however, yearly becoming fewer. The most serious consideration which north country men have to face is the cost of wintering. Within the last twenty years the expenditure entailed by this has doubled, and now as much as 7s. and 8s. per head has to be paid. The rent itself usually runs from about 2s. to 3s. on the summer stock. In connection with the Highlands, it is important that it should be pointed out that the extension of the fences would be one of the greatest advantages that could be conferred on the pastoral interests. Were farms fenced, sheep would be prevented from straying and being lost, scab might at last even be got rid of, and in the neighbourhood of deer forests there would be no more trouble and annoyance arising from complaints of trespassing.

The principal diseases from which the blackfaced breed suffer are braxy, rot, louping-ill, pining, sturdy, and foot-rot. None of these diseases are of recent growth; they are all common,

and have been long common to all kinds of hill sheep. This is apparent enough from the mention that is frequently made of them by old writers. In several now forgotten works a number of curious opinions are formed with reference especially to braxy, which seems to have exercised the fears of the flockmasters of last century. To the present day this disease continues to inflict the most severe losses. In the south a death-rate equal to 3 in the score among hoggs, due to this cause alone, is not uncommon.

In this breed, as in others, the fancy of the day varies considerably. It may, however, be said that the most successful breeders have a pretty definite ideal before them. The points which should be looked for in a perfect animal, as this is at present understood, are a thick, broad face; nostrils full; horns low set at the crown (that is to say, coming low out, and not rising too much), and turned backwards rather than forwards, and with a division or clear space on the crown between the horns; the colour of the face should be black and white, with the black predominating moderately clear and bright; the chest broad and deep; the shoulders lying well back; the ribs widely arched and deep; the back short, wide, and level; the quarters full and lengthy; the thigh strong and large; the body well set on clean flat legs, with well-developed joints; the wool uniform in quality, coming well down to the knees, with a strong deep fleece, and a fine sharp curl upon it, and free from kemp hairs, and blue or black. A slight tuft of wool on the forehead in young sheep is generally an indication of good wool. Judged by this standard, the sheep of the present time are deficient principally in their wool, which too frequently does not stand age; it being a serious defect to cultivate a class of wool that only shows a curl upon it in one-year-olds, and afterwards becomes short and bare. Some objection might also be taken to many sheep as being too narrow in the chest. The advice might, therefore, be given to breeders to aim at having the ribs of their stock wider than they have generally been in the past. Some attention to the manner in which the sheep are set upon their legs would also be well bestowed, as their legs have very commonly been too close together. The colour of the face should be closely kept in view. In many cases, the quality of the wool, as well as the substance of the sheep, has been a good deal interfered with by a tendency to run too much on clear-faced sheep. For avoiding very bright colour, it is not, however, altogether desirable to go to the opposite extreme. It is no doubt true that dun faces very often go along with good fleeces, but these should not be strongly recommended, as it is best to keep the colour of the face in moderation. It has already been pointed out that it is important to have the horns lying a little back. To the change that has taken place in this respect may to some extent be ascribed the improvement of late noticed in the frames

of the sheep with the "wheely" horns, so fashionable at one time; there almost invariably was found a hollowness between the eyes, which in turn indicated a certain slenderness of bone and delicacy of constitution. In regard to the development of the breed, it is only necessary to add that just in proportion as the practice of shedding ewes to select tups spreads, so will the maintenance of a good type be made the more certain. Any change in the breed which would in the smallest affect its hardiness is to be strongly guarded against; but there is little fears of this, or its powers of endurance being affected, so long as width of chest is made the chief point in the shape of the animal. There can be no doubt of the future of the blackfaced sheep. It has carried a high character; its friends include many of the nobility of the country, whose purchases at the leading sale rings give an impetus to breeding; it has, in fact, become of paramount importance in relation to the pastoral resources of the country.

NOTE BY THE EDITOR.

In the two preceding papers on blackfaced sheep, no allusion has been made to the importance of grazing cattle on the ground. I myself, from an experience of over thirty-three years, am quite confident that not only are sheep very much more healthy, but a greater number can be kept on a farm when cattle are grazed on the rough coarse grass. My system is to put a considerable stock of cattle on to the ground in the end of May or beginning of June, and I have them herded by a boy, who is directed by the manager from time to time where to keep them, and I take them off the end of August. When I first took my present farm, no cattle had been on it for some years, the sheep were very unhealthy, and the death-rate, chiefly from trembling or louping-ill, enormous. Now the deaths are very few, and trembling has all but ceased. I have letters from sheep farmers of great experience on the subject. A well-known farmer in Ross-shire writes—"I have had plenty of experience of this both with myself and others. I believe that the heavy tramping of cattle, where they don't cut the ground too much, helps to firm the ground and sweeten the grass. You can scarcely go wrong in putting a good many cattle along with sheep from March till the middle of August." He adds—"I can also corroborate your remarks as regards trembling."

A very skilful manager of both sheep and cattle in Perthshire, who is very successful in the prize rings, writes—"The grazing of cattle along with sheep is what I have advocated for a number of years. In a large tract of woodland here the sheep have always wintered better, and quite as many of them, since I summered cattle in it, and the rough grass on the hill has been much greater benefit to the sheep since I began to graze cattle on it." He adds—"I am often surprised the farmers on the upper farm here do not graze more cattle, and as a result, their sheep are deteriorating very much."

In those days of cheap wool and agricultural depression, surely the sheep farmers should not throw away a chance of adding to their farm receipts, and at the same time improving the health and quality of their sheep.

ACCOUNT OF THE SHOW OF THE HIGHLAND AND AGRICULTURAL SOCIETY HELD AT INVERNESS IN 1883.

THE annual Show of the Society was held at Inverness on the 24th, 25th, 26th, and 27th July. This was the fifty-sixth Exhibition, and the seventh which has been held in that quarter.

The site chosen for the Show occupied about 24 acres on the farm of Dalneigh, on the estate of Mr Baillie of Dochfour, and in close proximity to the town. The situation was beautiful, commanding a view of the woods of Culloden, Ben Wyvis, the valley of the Ness, the Beauly Firth, with the Black Isle, the remarkable hill called Tomnahurich, and the wooded mountain ridge which terminates in Craig Phadruig.

In no district visited by the Society is there a greater degree of interest excited among all classes than in the capital of the Highlands. It was, therefore, with a corresponding feeling of regret that the inhabitants learned that, in consequence of the prevalence of foot-and-mouth disease in Scotland, the propriety of holding the Show was discussed by the general meeting in June. Fortunately, however, the Directors, in consideration of the regulations by the local authorities of the county and burgh of Inverness and the wishes of the exhibitors, resolved that the Show should go on, though no doubt fear of contracting disease prevented some who had made entries from sending their stock. It is satisfactory to state, on the authority of Principal Williams, Edinburgh, and Mr Thomson, V.S., Inverness, who were in attendance throughout the Show, that the stock was in a healthy and satisfactory condition; and it is a source of much gratification to add that no evil resulted from the Show.

The general arrangements of the yard were similar to those at former meetings of the Society, but some of the fittings were arranged in a somewhat different manner than usual, the Committee Rooms, Members' Club Room, General Meeting Pavilion, Band Stand, and Refreshment Tents being erected right and left of the main centre thoroughfare.

For the first time in the history of the Society, stewards were appointed for the different departments—Sir James Gibson-Craig, Bart., being for Cattle; Lord Arthur Cecil, for Horses; the Rev. John Gillespie, Mouswald, for Sheep, Swine, Poultry, &c.; Mr Forbes of Culloden, for Forage; and Mr Scott Dudgeon, Longnewton, and Mr Shaw, Skaithmuir, for Implements.

The business of the meeting commenced on Tuesday morning, with the judging of the stock, at eleven, and took place during

much rain; in the evening the Directors and Judges dined in the Caledonian Hotel. On Wednesday the yard was open from 8 A.M. till 5 P.M.; throughout the day the rain fell fast and thick, and planking was laid down; the Showyard meeting of members took place at 1.30 P.M.; and the President's dinner was held in the evening in the Caledonian Hotel—Lord Lovat presiding, and Mackintosh of Mackintosh acting as croupier. During Thursday the weather showed an improvement, and the yard was open from 8 A.M. till 5 P.M.; in the evening a ball was held in the Northern Meeting Rooms, and was attended by about 200 ladies and gentlemen. On Friday the yard was opened at the same hour; the weather kept fine, people poured in from all quarters, and the business of the meeting was brought to a close at 5 P.M., highly to the satisfaction of all interested.

During the three last days of the Show, the band and pipers of the 2nd Battalion Queen's Own Cameron Highlanders, as well as the pipers of Sir Robert Menzies, performed an excellent selection of popular pieces.

The front of the Committee Room was tastefully laid out by Messrs Munro Brothers, nurserymen, Inverness, with a choice variety of evergreens, which imparted to the building a very neat and pleasant appearance.

The exhibition consisted of the following entries in the different classes of stock:—

Cattle.

	Bulls.	Cows.	Heifers.	Oxen.	Total.
Shorthorn, ...	35	14	25	2	76
Ayrshire, ...	6	12	11	...	29
Polled Angus or Aberdeen, .	33	11	50	2	96
Galloway, ...	3	5	16	...	24
Highland, ...	37	25	36	10	108
Fat Stock, ...	...	...	2	12	14
Extra, ...	...	2	...	5	7
Total, .	114	69	143	31	354

Horses.

	Stallions.	Entire Colts.	Mares.	Fillies.	Geldings.	Total.
Agricultural Horses, .	9	61	20	39	6	135
Hunters and Roadsters, .	...	...	11	...	8	19
Ponies, ...	4	...	8	...	4	16
Extra, ...	2	...	...	...	...	2
Total, .	15	61	39	39	18	172

Sheep.

	Tups.	Ewes.	Gimmers.	Lambs.	Wethers.	Total.
Blackfaced, . . .	44	36	36	36	60	212
Cheviot, ...	27	6	12	6	5	56
Border Leicester, . .	27	21	27	...	...	75
Long-Woolled, other than Border Leicester,	...	...	...	...	...	...
Shropshire, . . .	11	9	6	...	...	26
Short-Woolled, other than Shropshire,	1	...	...	...	...	1
Extra Section, . . .	...	...	...	...	5	5
Total, .	110	72	81	42	70	375

Swine.

	Boars.	Sows.	Pigs.	Total.
Berkshire Breed, . . .	2	3	9	14
Small Breed, ...	1	2	9	12
Extra, ...	1	3	3	7
Total, .	4	8	21	33

Collie Dogs.

Long-haired Dogs, ...	19
Do. Bitches, ...	3
Short-haired Dogs, ...	2
Do. Bitches, ...	2
	26

Poultry, ...	303 entries;	304 head.
Implements, ...	1280 entries;	105 exhibitors.

The following is a comparative view of the exhibition of the stock and implements, the premiums offered, and the receipts (gate money and catalogues) at each of the seven Shows at Inverness :—

Year.	Cattle.	Horses.	Sheep.	Swine.	Poultry.	Implements.	Premiums.	Receipts.
1831	198	77	129	11	...	4	£318	£71
1839	302	93	445	43	...	24	744	211
1846	428	112	357	33	76	59	1050	254
1856	248	131	469	43	156	231	1000	315
1865	361	132	812	43	294	707	1300	920
1874	391	175	477	48	451	1161	2030	1120
1883	354	172	375	33	304	1280	1978	1295

Cattle.

The shorthorns were, both in respect to numbers and sustained merit, a good show. In the section of aged bulls there were fourteen entries, four of which were absent. The first, second, and third prize bulls were animals of great merit. In the two-year old section there were ten entries, and only one absent. There was considerable diversity of type and character in this section, and it was with some difficulty that the Judges could get animals of the same character to follow each other in the prize list. The prize bulls, however, were all well covered with flesh over the quarters, loins, and ribs, and were very useful animals. In the one-year-old section there were ten entries, three of which were absent. In this section the first prize bull was decidedly the best male shorthorn in the yard, and got the Tweeddale Gold Medal accordingly ; the other prize bulls were a very good lot. In the section for cows there were fourteen entries, and all present. The first, second, and third prize cows were animals of great merit, being young cows, and evenly fleshed, with good feminine character ; the others were so good that five were highly commended and commended. In the section of two-year-old heifers there were seven entries, and all present. There was a lack of quality in this section. The first prize animal was rather strong in her bone, but had a good outline, being deep in carcass and well balanced ; the others were a fair good lot. In the yearling heifer section there were seventeen entries, and three absent. This section was large, and generally a good one. The prize animals were a very promising lot. "Rosaria 2nd," the first prize aged bull at Glasgow in 1882, was present, and looked as handsome and evenly fleshed as when exhibited in his younger days.

The number of Ayrshires was altogether very small in every section, but the quality of the different animals was very good, particularly the section of bulls, those carrying the first and

second prizes being first-class animals. The cows in milk were not what one would like to see at the Society's Shows, only two being shown of ordinary quality. The section of cows in calf was a very fine one, all the animals shown being of very good quality. The first and second prize animals, in the section for two-year-old and one-year-old heifers, were all of first-class quality.

The Polled Angus or Aberdeen breed was very creditably represented. In a small but good section of aged bulls, the first prize animal was an admirable specimen of the breed, and very well developed for his age, broad, deep, and level in form, with a very rich cover of evenly laid on flesh. The two-year-old bull section was larger, but it was not quite so good as it has been at some recent Shows. In the section of yearling bulls there was a very long and a very close contest between the first and second prize animals. Both were of very high merit—the first long, level, and stylish ; the second shorter but thick, compact, and also of attractive character. Again, between the third and fourth bulls, both thick, large, and heavily fleshed, the result was for a considerable time doubtful. In the section of cows, which was very good indeed, the first prize animal had very strong opposition, but could not be passed over. On account of their excellent symmetry, true character, fine quality, and levelness, two smaller cows (smaller to appearance than in reality, as they stood on short legs) were selected for the second and third prizes. Two or three of the other cows also showed very high merit. In point of excellence the two-year-old heifer section was the best in the class. The three prize winners have rarely been excelled at their age, the first, in particular, being an animal of great size and wealth of flesh, and almost faultless in symmetry and character. The yearling heifer section, in which there were no fewer than thirty-two entries, but a good many empty stalls, contained about a dozen animals of very high average merit, such as may be safely entrusted with the perpetuation of the breed. The first and second prize heifers competed closely, the excellent underline and robust, yet truly feminine character of the first, ultimately carrying her to the front. The third prize heifer was small in size, but almost perfect in symmetry. Prince Albert of Baads (1336), winner of the first prize at Kelso in 1880, was shown as extra stock, and being still in good form, was greatly admired.

Seeing the site of the show was so far distant from the south-west of Scotland and the west of England, where Galloways are kept, it was not to be expected that there would be a very numerous representation of that breed at Inverness. But while the entries were fairly numerous in these circumstances, the turn-out was miserably small. This was solely due to the fear

of foot-and-mouth disease entertained by intending exhibitors. There were only seven animals forward, comprising one aged bull, one cow, two two-year-old heifers, and three yearling heifers. The aged bull was a capital animal, and although he was a little undersized, yet he was symmetrical, stylish, and of excellent quality. He looked well, especially considering the fact that he came direct from York, where he had been exhibited in the Royal Showyard for nearly a week. The cow was a superior animal in good bloom. The first prize two-year-old heifer is a very good one, with level outlines, and combining substance and quality in a special degree, while the one placed second was not far behind her. The first prize yearling heifer was a well-proportioned promising one, while the second was first rate in almost every point except at the tail roast, which was beginning to show symptoms of patchiness.

Although several good herds were not represented, the show of Highland cattle was large and attractive. All the various classes were represented, and the places of merit were keenly contested in each. The display will compare favourably with any held under the auspices of the Society for some years.

The class of fat cattle was very creditable, being marked by an almost total absence of too old and overfed animals, which cost much money, and make beef of a very inferior quality. The large number of six-quarter-old animals were very good.

Horses.

As a whole, the stallions for agricultural purposes was a fair collection. Aged horses did not muster strong, and as a class were not of very equal merit. One or two animals in this class were considered of the best stamp to breed from, but not in good form at the time. The three-year-olds were a better looking lot, the leading horses in this class promising well at their age. In two-year-old colts, the first and second prize animals were clearly ahead of the others, good colts, though of very different stamps from the two first. Yearlings mustered well, by far the most numerous class, and many promising youngsters amongst the lot. Those awarded premiums were perhaps of more equal merit than in any of the older lots.

The display in the sections for draught mares, fillies, and geldings, though short of what it usually is when the Show is held in the south, was on the whole much better than might have been expected, and in almost every section the prize winners were animals of high merit. The mares with foal at foot were a moderate class, but the first prize winner was a good animal. The mares in foal were a much better class than the preceding, the first and second prize mares being especially in a high degree meritorious. The three-year old fillies were a small

class; both the first and second prize animals were good fillies; of the two, the latter had more quality, but it lacked the size and substance of its more successful rival. The two-year-old fillies were a large class, and the best of all the sections. The first, second, and third prize winners were animals of extraordinary merit, all three being splendid specimens of the Clydesdale breed; and several others in the class gave promise of future distinction. The yearling fillies were a fair class, the first and second prize winners being especially meritorious. Only three aged geldings appeared, but they were all valuable horses. The three-year-old geldings were also a small class, but the first prize winner was an extra good animal.

In the roadster, hackney, and pony classes there was a smaller exhibition than was expected. The Judges had little difficulty in coming to a decision. The first and second prize winners in the section for hackneys were very superior goers. In the extra class there was but one animal that answered this description—a Basuto pony—a strong, active, useful-looking animal.

Sheep.

The quality of the blackfaced sheep exhibited, no less than their number, far exceeded any other class of sheep in the Show-yard. This was especially the case in the sections for shearling tups and gimmers, which were numerously represented, and included animals from some of the most noted and most admirably bred flocks in the country, which probably had never been excelled at any former Show of the Society.

Cheviot sheep were not numerous, nor was there anything special in the quality. Tups were below an average, but ewes and gimmers made a fair appearance.

The Border Leicesters were not so numerous as when the Society visits the home of the race, but the excellence of the show fully maintained the high character of these valuable and symmetrical sheep. The prize animals were splendid specimens of the breed, and the unsuccessful exhibits were creditable to their owners.

The Shropshire sheep exhibited fairly represented the character of this very useful rent-paying sheep, marked by hardiness of constitution, large amount of lean flesh, good quality and weight of wool. The exhibitors are entitled to the credit of having done much to enhance the reputation of this valuable breed of sheep, which is now firmly established in Scotland.

In fat stock, the blackfaced sections were uncommonly nice, and it is doubtful if such a large number of well-finished wethers was ever seen in any showyard. The other classes of

sheep, namely, Cheviots and crosses, were smaller, but composed of very serviceable animals.

Swine.

Of swine there were nineteen entries by eight exhibitors. Although the display was not equal to several of the former meetings at Inverness as regards numbers, a few of the animals were very good. The large boar, which took the first prize at Glasgow in 1882, was exhibited as extra stock, and being highly commended, a minor gold medal was awarded.

Collie Dogs.

The rough-haired collie dog section was a very good one, both in numbers and quality, some of the animals being of very great merit. Rough-haired bitches were an average class. "Halla," winner of the first prize at Stirling in 1881, was present, and being very highly commended, a minor gold medal was awarded. There were two entries in each section of short-haired collies, but the class was unrepresented.

Poultry.

The silver grey dorkings were a very good class throughout, as were also the coloured, though not so numerous. Cochin-chinas were very fair. In Brahmas, the old section contained nothing of special note, but the young birds were very promising. The Spanish was a really good turn-out, comprising birds of great merit, one of the best shows of Spanish ever seen at the Society's Shows. Scotch greys were also a very fine show. The remaining classes, with the exception of ducks, geese, and turkeys, were rather below the average.

Implements.

Considering the distance that Inverness is removed from the great centres of implement manufacture in the south, the display of high class and valuable appliances for reducing the labour bill to the farmer was most satisfactory.

The arrangement of the implement yard was much the same as at former Shows, except that more care was taken to place all the implements, purely agricultural, quite distinct from the other exhibits; and that for the first time the control of the implement yard was in the hands of stewards.

Prizes, after competitive trial, were offered for potato planters, turnip thinners, and weed eradicators, which at the proper seasons have still to be competed for. The machines entered for trial are now locked up at Inverness in the hands of the Society. Some of the Inverness tradesmen exhibited very creditable collections of implements, and the south country manufacturers deserve great credit for their energy in going so far north to display their goods.

The sales in the yard were very satisfactory, and it was considered that all the exhibitors were well remunerated for the expense and trouble they incurred in going so far north. Some exhibitors, from a selfish point of view, maintain that Inverness is too far north, and that it should be dropped out of the rotation of the Shows, but it would be a sad mistake to deprive the agriculturists in that district of the opportunity of seeing all the most approved implements of agriculture, more especially as the Society was first established for the benefit of the Highlands.

Highland Industries and Fisheries.

The only entry in this department, which the Society saw fit to re-establish last year, was a guard rail for fishing boats and other vessels, patented and exhibited by Mr John Gunn, The Hermitage, Golspie. This invention is intended to prevent the great loss of life caused by men falling or being washed from the decks of fishing boats, the gunwales being so low that without guard-rails they afford little or no protection to the fishermen. This rail, whilst affording ample protection, is at the same time of such a character that it can be raised or lowered at pleasure, in suitable sections, with ease and rapidity. The Directors were so highly pleased with the invention that, in addition to the premium of £8, they awarded Mr Gunn a medium gold medal.

Bee Husbandry.

The Caledonian Apiarian Society held their annual show in the bee tent, erected for their use, in the Showyard. Owing to the very unequal season, the honey display was the worst that has been since their opening exhibition in Edinburgh in 1877; but at no Show, either in England or Scotland, has there been so much interest taken by the general public in driving and manipulating operations carried on in the covered tent, and there cannot be a doubt that these exhibitions are a step in the right direction, as it educates a class, such as shepherds and agricultural labourers, &c., who can (if they only obtain the knowledge how to do it) supply the market, not only of Scotland, but also of England, with the finest of all sweets, namely, heather honey, and thus keep the trade at home. Mr Bennett, the Secretary, has long held the opinion and advocated the cause of home-collected honey. He boldly affirms that £50,000 per annum could be collected from our heather hills, if Bee farmers would only give half their attention to their stocks that they do to any other portion of their farm work. They might calculate on 100 per cent. at least, on capital expended, over a period of five years. Mr Bennett, Honorary Secretary, 50 Gordon Street, Glasgow, will be happy to give any information and enrol members.

THE NATURAL AND ARTIFICIAL FOOD OF SCOTCH HILL SHEEP.

By Robert Wallace, Professor of Agriculture, and Edward Kinch, Professor of Chemistry, Royal Agricultural College, Cirencester.

[*Premium—Twenty Sovereigns.*]

Part I.—By Professor R. Wallace, F.R.P.S. and M.R.A.S.E., &c.

A lively interest has been awakened within recent times as to the grasses which form the best of the old pastures of England, and also as to the seeds that should be sown in the laying out of new permanent pastures. A good guide to the value of most of these has been given by analysis. We are not aware that the composition has ever been determined of those plants grown on hills and moorlands that are found by experience to be valuable to sheep.

Such information is quite as necessary to the hill farmer as the former is to the lowland grazier. In consideration of this, analyses have been carefully made by Professor Kinch, of the Royal Agricutural College, Cirencester, of all we considered important or necessary. The results, along with his remarks, are published in Part II. of this paper.

It is quite true that in a hill country we cannot determine on the kind of grass that shall grow by sowing the seed, as a lowland farmer can; but very much may be done by the alteration of natural conditions, so as to make them better suited to the healthy growth of the more valuable plants; and again, by laying out the boundaries for any one lot of sheep in such a manner as to include a suitable change of food, not only for the one season of the year, but for all different times and seasons. It is often the case that the boundary fence or dyke of a farm, or subdivision of same, runs on the borders between the land good for winter food and for that only on the one side, and on the other, hard green land excellent for summer pasture, but of little use in winter. It is clear, that if a certain "stock" or number of sheep were put on each division, the one lot would be doing well when its pasture was at its best, and the other lot would be going back because its pasture was bad, and *vice versa;* whereas, if both lots of sheep were put together, and the shepherd, understanding his business, were to turn them at different seasons of the year over the land best suited at the time, the sheep would not only be in good condition the whole year through, but more stock could be kept in good order on the same land, as the amount of stock any

place will carry must be governed by the minimum supply of food at any one particular season. The latter remark applies to all, but refers specially to grazings which do not have hoggs wintered away. Much might be saved, if farmers would first get to understand the values of the different kinds of plants on the different descriptions of ground; and secondly, arrange in "hirseling" their sheep, that each division should have its due share of every kind of pasture; and thirdly, encourage the better growth of the best pastural food plants. Some grown under certain conditions are much eaten by sheep, while under other conditions they seem only to be taken if nothing else can be got. The latter fact is most important, as we shall see more fully when we come to speak of the different sorts separately.

In addition to the considerations as to the natural food, this paper contains results of our experiences with regard to the judicious administration of artificial food to hill sheep at certain seasons. Our observations extend over a period of ten years, but more particularly within the last three years, when we have had a better opportunity of carrying out such experiments on an extensive scale and in a satisfactory manner.

No lowland pasture can be really first-rate, even on good land, unless it has all through it a sufficient number of good natural grasses of the varieties that come forward to perfection at the different seasons—spring, summer, and autumn—each set giving way as it were in turn to the one which follows. It is the want of good spring-growing grasses that makes a pasture (noted for its summer grazing powers) backward and bare in the early months of the year; while the sudden failure of others in autumn can be accounted for in the same way.

This is a matter worth considering in a low country, but as the difficulty can be easily met by supplying artificial foods, it is not of so great importance as in a hill district, where a given amount of stock is desired to be upheld by natural food as much as possible; and that not only for the three more favourable quarters of the year but for the adverse winter season as well. Hill grazings differ materially from lowland pastures, in that the soil is not so homogeneous or the plants so thoroughly intermingled on the same ground. A patch of one kind of soil is found growing a few varieties of plants in perfection, while others, to which the conditions are not suited, are there only as it were on sufferance. Adjoining this is another description of soil, or it may be the same, but subjected for a long time to a different degree of moisture or some other external influence; the plants here may have changed places as to relative numbers, or some may have disappeared altogether, and others taken their places. Hill land not only presents a most irregular surface, but in this way a very varied appearance, and great difference in point of money

value. The influence of climate as affected by elevation; the amount of moisture; the amount of sunlight and heat available particularly in winter, (depending on how the hill ranges run); exposure to prevailing winds; and the liability to death of stock on some grounds—particularly when subjected to certain sudden changes of weather—affect the value of land to a greater degree than is supposed by the general public.

In reviewing the valuable hill plants, we begin with common heather, *Erica* (*Calluna*) *vulgaris*, because it covers a greater extent of surface than any other, and is perhaps best known to all classes. To the general public, especially tourists, it is interesting on account of the lovely purple its flowers lend to the hillsides in August and September. To the sportsman it is known as that part of the food of grouse and black game which gives the wild flavour to their flesh, and as the shelter in which these may cower in the early part of the season until within range of the gun. With the farmers' interests we have more to do. Sheep are very fond of the young and tender shoots, and will eat them at all times of the year, more or less vigorously, according as there is a large or short supply of other food. Winter is the season when a sufficiency of heather is most valuable, owing to its being evergreen, and from its habit of growth standing up on a strong woody stem, so that sheep get readily at it during a storm of snow. It resists well the action of frost in ordinary years, or if covered to a small extent by snow; but, sometimes after a long "black" frost in winter, it becomes of little value late in spring before the new shoots appear. This particularly if it is very old; *i.e.*, if it has been too long since it was burnt. The burning of heather may take place any time after it is dry enough in spring until 11th April, when grouse nests begin to be found, and it would be injurious to the game. When thought desirable by all concerned, burning may go on for fourteen days longer, with an order from the sheriff and the consent of the proprietor. It is a most necessary operation for every one who has in it an interest that can be measured in money. There is only one right treatment, although there are fifty different opinions about it; and we are sorry to say the matter does not rest there. Heather burning has been, and is, the cause of much dispute and bad feeling between tenants and proprietors; and the strange thing about it is, that whoever is in the wrong, be he tenant or proprietor, is doing, although he may not know it, an injury to himself as well as to his opponent. If too much surface be burnt by the tenant, then there is not enough shelter for the proprietor's game in the shooting season, but at the same time the tenant's sheep will suffer during the first severe snow-storm, the very time that heather is most valuable. He has no doubt more heather-growing land in good summer feeding

order, but at that season every other thing is green and abundant, and it is not wanted. On the other hand, should, at the desire of the proprietor, too little be burnt, the evils to himself and land are considerably greater, though more insidious. Heather, when very old and large, loses vital power, grows slower, and in some cases may even die or be killed by severe frost. When burnt at last, it is found to be growing from a few roots. The plants are long in forming fresh shoots, and when they do come, there being but a small extent of them, the sheep or cattle on the grazing continue to pick up every green shoot that appears, because of a want of a sufficient supply of this kind of food, until the roots die, and grasses of different sorts permanently take the place of heather. There is no doubt that many of our hard green hills were at one time, and that quite recently, clad with luxuriant crops of heather, and were then far more valuable, both as shootings and as sheep walks, than now. If the sheep stocks were removed for a number of years, no doubt many of these would grow heather once more. So also, we have good reason to believe, certain districts would, under similar treatment, soon become forest. As such treatment is out of the question, all we can do is to preserve what is yet left, by a more rational system of management. In addition to the future evil consequences, very rough heathery land is not for the present best for grouse or black game, except that it is "more easily shot." The birds do not want the shelter at breeding time, as nests are found in detached bunches, not in dense masses of long heather.

No doubt it is instinct which leads game to see that young ones in wet seasons would get thoroughly soaked and chilled to death, if among a rank growth of any sort. This is exactly what happens if a large proportion of the ground is too rough ; the little ones, after they are hatched, wander into it, and never come out again. Then again, old heather is no use as food, as it is only the younger and most tender shoots that grouse care for. The consequence is that the birds, although they like shelter at times, migrate to places where they get the most agreeable food, and are likely to remain there most of their time, as well as die there. A very remarkable instance of this peopling a hill with grouse, by burning of old and useless heather, came under our notice some years ago in the case of a holding, Glenlee Mains, in Galloway, which was once farmed by us.

Heather should be burnt in regular rotations, $\frac{1}{6}$ or $\frac{1}{10}$ of the whole every year; the amount being determined by the nature of the ground. As I mentioned before, heather grows on nearly every description of hill and moorland, but much more slowly on hard, dry land, than on "living moss." Less is consequently required to be burnt on this land, though regular attention to it

is more necessary. Heather may be neglected to almost any extent on soft moss, and grow again after burning, but it is not so with the slow-growing heather of dry land.

By far the best way is to burn it in strips, not too small. Of course, it is more expensive than simply burning a large patch here and there, as more men are required to keep the fire within control, but there are many advantages. A clear road is made through the rank heather for sheep to get about from one part to another, without having to go a long way round, as would often be the case ; and again, the different ages of heather are all close together, which is an advantage both to sheep and game. The latter have the best and youngest shoots to feed on alongside of the roughest parts, which are only good for shelter. Another loss to the farmer, from allowing heather to get too old before burning, is the large amount of wool which is torn from the bellies of the sheep, as they walk over the ground, by the stalks or "birns" left standing for years after. If farmers and proprietors could only come to see that their interests in heather burning are identical, it would do away with almost the only source of difficulty between them in these high districts.

The two plants, *Erica Tetralix*, or bell heather, and *Erica cinerea*, or ling, are of comparatively little use as food either for sheep or grouse. There is a little confusion in some botanical books as to which of the so-called heathers is "ling." In Scotland there is no doubt that ling is the *Erica cinerea*, that plant with the long slender stem growing in wet moss land, and made into the brooms which are regularly seen in farm kitchens.

We will next take the useful *Juncaceæ*, or rushes. First, stool bent, *Juncus squarrosus*. This little rush, like heather, has the valuable property of being evergreen. It is much eaten by sheep when grown under suitable conditions ; *i.e.*, on black-topped or moss land which is moderately moist. If very wet, the plants that do grow are small, and not relished. The leaves are succulent, particularly where they join together at the crown, and agreeable to the taste, and are greedily sought for by sheep in "hard" weather, when no snow, or only a slight covering, is on the ground. In snow the plant is not easily got at, from its habit of growth being to spread out its leaves all round from the centre close to the ground. When not covered up, however, a sheep gets right into the crown of the plant, and leaves but a small portion of it, reminding one of the shells of turnips which sheep hollow out when eating a standing crop. Like some other plants on which sheep fall back in winter and spring, stool bent is entirely neglected by them when the full flush of grass in summer arrives. These plants are very well in a sense, and invaluable at their season, but grasses grown in the summer sun have far more flavour as well as feeding value.

"Spret," *Juncus articulatus*, is the only other rush that is a valuable food on hills. It gets the name "*articulatus*" from a false joint that is to be seen every here and there in its upright hollow leaves. It is not evergreen, unless in very mild open winters, when the young shoots or "pods" have been found growing the whole season through. The plant is essentially one belonging to a moist or even wet, but not a pure, moss soil. The young shoots push up in spring, or, as I have said, even in winter whenever the weather is mild enough to encourage growth, like as many little green darning needles, from thick woody underground stems, which often run pretty close to the surface. Sheep begin to pull and eat these as soon as they are long enough to get hold of; and on such land (which is usually stocked with the Cheviot breed) sheep do well, and have a large number of lambs, if the spret is to be had early in spring, in March; while they are sure to do badly if it is a month later. When a little more developed, cattle, like sheep, eat it and thrive well. Both, however, leave it off to a great extent as the plant matures with the advancing summer. If cut about the end of July or in August, when coming into flower, it makes excellent hay for cattle, though too coarse for sheep as a rule; it is much valued for making hay-tea for cows after calving in spring. Strong well-grown spret makes the best of thatch for hay-stacks in a hill district. Put on green, it lies down flat, and will remain good for two years. It has the great advantage over straw, that rooks and others birds, on the look-out for grain, don't scrape it off and destroy the roof. The great disadvantage of really first-rate spret land is, that it grows spret far too luxuriantly, to the exclusion of almost all else. In such a case, the stage is soon passed at which cattle and sheep eat it, and it is too coarse for hay when that time comes. Finally, it falls down as autumn advances, or with the first cover of snow, and there rots, destroying every other green plant, and being itself of no use for eight or nine months of the year. The usual remedy is to surface drain thoroughly, and see that the drains keep constantly running by frequent cleaning, which is no easy matter, as the roots of strong spret in a very few years will quite choke an ordinary drain. There is no doubt but deep draining gives by far the best result on such land, but then the extra cost puts it quite out of the question in ninety-nine cases out of the hundred. There is this, however, to say for it, that if deep draining will not pay on the best quality of spret land, it need not be attempted on any other description of hill pasture. Draining weakens generally the growth of spret, and not only improves the quality of what remains, but allows fine grasses, principally Fescues and Poas, to come up. The growth which is not eaten off in summer remains standing, and is then of some use as foggage in winter.

Fescues grown under the above conditions very frequently becomes viviparous—that is, in place of seeds forming out of the flowers, young plants are produced on a spike at the top of the flower stalk. These can be planted and made to take root and grow. This is a peculiarity met with in various orders of plants grown on high and wet districts where there is not sufficient sunshine to mature seeds; and is no doubt a provision of nature to allow for the propagation of the species, other than by the usual way of seed, when the conditions are not favourable to these ripening.

Other methods are adopted for keeping down the excessive growth of the spret plant. Grazing cattle along with sheep, if judiciously managed, is a very excellent plan. Burning off all withered remains of the growth of the previous year, during the dry weather of spring, is an easy method, and has some special advantages in destroying parasitic pests which may be lodging there. It has one disadvantage, that there is no use made of the produce of the soil, all being dissipated; and besides, there are certain classes of clay bogs that are much injured for years by such burning.

I approve more of the very effectual way of cutting for hay. This, if under the care of an intelligent shepherd who has the interest of his sheep at heart, cannot fail to be a success. The experienced shepherd knows what will stand and be of use in winter, and what will fall and decay. The same part will not require to be cut more than once in two or three years. Of course, this way is expensive, and would only be gone in for when hay could be made use of to advantage; and operations of this sort, especially on a large place, must be within controllable limits. It is not too much to say, however, that a certain amount should be cut for the purpose indicated on all really good "spret-land" farms. There are advantages besides those already named. The aftermath of fine fresh grasses and young spret which comes up, is most valuable in autumn, when nearly all else is old and partly withered, and the best eaten out of it by the sheep. If the winter be frosty, such bare land would be of no use; but, on the other hand, if the weather be fresh and open, there will always be green pickings got all through, and will be the first available when growth comes next spring. One disadvantage of burning is the checking of the early spring growth, besides the browning by singeing the tips of the young shoots, and so preventing sheep eating them so soon as they otherwise would.

The great thing to do in mowing hill land is not, as is usually supposed, to avoid cutting too much, but to cut the right places at the right season, which latter means not too late in the year.

We now take the *Cyperaceæ*, including sedges, and after that the more important plants will be arranged in the order in which

they come in season, without regard to their botanical "Natural Order."

Draw-moss, or sheathing cotton sedge, *Eriophorum vaginatum*, is a most invaluable plant on certain farms, where it exists in quantity. It forms often the backbone of the early spring food of some places, and when sufficiently abundant and forward by the end of February, no fear need be entertained of ewes being in bad condition at lambing time. Many farmers consider that a good supply of draw-moss will prepare ewes better for milking and lambing than a full allowance of turnips, and it has the additional advantage that it is their natural food. Draw-moss grows best on very wet mossy land. The plant exists on dry moss land, but is then of no use. Its habits and time of growth are entirely changed. It grows more or less in tufts. As early as January, if the land is sufficiently moist and the weather mild, large handfuls of rounded succulent leaves may be pulled up from these places, 6 or 8 inches long, the part which has not been exposed to the air being beautfully white, and agreeable to the taste. As it shoots up into the light with the advancing season the leaves become green, and fade or wither next "fall" after frost to a uniform brown. The tufts of draw-moss are distinguishable by this at a little distance in winter time from tufts of another plant, deer hair, which is not unlike it in the withered condition, but has a mottled appearance from the presence of different shades of brown on each stem. When the season is cold and backward, or if the land is naturally, or from overdraining, too dry, the "moss" will often not be "come" sufficiently to draw or be of any use till even the end of March or into April, and this on many places makes the difference between a first-rate year and a very bad one. This covers the most critical time of all the year, including the "milk-making" month, March. No subsequent favourable conditions can ever make up for loss sustained at that time. Again, a "black-frost" sometimes comes late in spring, and binds up the land, so that the "moss" will no longer "draw." This, however, is not often so serious, as, if fairly grown, the sheep can do very well for a time on what has risen above the ground, and which breaks off short on being pulled. The appearance of the "moss-crop" or flower indicates that the leaves are well forward and will pull. The flowering spikelet is single and terminal; when matured into fruit, it has a woolly or cottony appearance. It is distinguished from the worthless common cotton sedge by the latter having more than one flower on the stalk and more cotton on the seed. There are also on the latter very few radical leaves, which constitute the valuable part for sheep, and it only grows well in choked-up ditches and on land excessively wet, such as a hole from which peats had been cut at one time, and no proper outlet drain made

Draw-moss is most valuable when situated in a low and sheltered place. Good "moss" is often found on the exposed, wet tops of high hills, but is of no use in stormy weather, which is often too frequent at the very time the food is most wanted. There is one very important point in the treatment of draw moss land on which too much stress cannot be laid, and to neglect which is ruinous in the extreme, and that is, *it must not be over-drained.* The wetter the land, the more luxuriant the plant grows, and the earlier does it come in spring. The land must only be dry enough to allow sheep to pass freely on to it, and no drier. This point can be easily ascertained practically. Many a man has ruined his farm, his stock, and himself, by draining such places "not wisely, but too well." Burning is not, as a rule, suited to land of this description. Now and again, if getting very foul, it may be allowed, but by no means frequently, as it weakens the plant, and renders it of little service the first season.

Carices, or common sedges, might have been taken sooner if we had been arranging the plants in order of their early growth. Though valuable, they are not of so much importance as those that have been already mentioned, because they occupy but a small proportion of the surface area. There are very many different species commonly found, but the two most useful that we specially mention are the tufted and carnation carices, *C. cæspitosa* and *panicea.* These may be seen growing all the winter in damp places, more or less according to the kind of season, and are sought after and eaten by sheep. The "pry" hay of some districts is made from sedges. This is the first illustration we have come to of a plant, which is valuable on hill pasture, but which is despised in the south and considered an indication of poverty, or rather of wetness, which is a synonymous term in many cases. The carnation grass (so called from its peculiar glaucous green colour) of the south of England is a well known indication of a cold clay subsoil, or what we in Scotland would term a "till-bottom."

Common nard, mat-grass or wire-grass, *Nardus stricta,* is hardier, and comes earlier in spring than any other grass. It appears in a good year and in an early district in March, while in a cold year or on the Highland hills often a month later. After getting a start, however, it keeps growing, although the weather be very backward. In exceptionally mild seasons, as 1883–84, new leaves spring in autumn and continues to grow the whole winter and is constantly eaten. It grows to perfection only on hard dry land, and is, somehow or another, found in abundance on farms much subject to "trembling" or "louping-ill." We don't for a moment suppose it has anything to do with the production or encouragement of the disease, only this is a coincidence which has been noticed and remarked upon. It is

constantly eaten by sheep before it runs to flower: it then becomes hard and wiry, and consequently unpalatable and unsuitable. Wire-grass land is much improved by being burnt in spring, and the earlier the better, to prevent singeing of the tops. This also carries out Professor Williams' idea of destroying the organisms which produce such diseases as louping-ill.

Deer hair, *Scirpus cæspitosus*, comes a little latter than wire-grass ; varying much with the season, from the beginning of April till even into May at times, in the "Highlands." It grows best on mossy and damp soils. Where there is no draw-moss deer hair is eagerly looked for by the shepherds, as on such black-topped land sheep are never independent until it is fully come. Where there is a considerable amount of hard land growing nard, this takes its place. By June, or even before, if plenty of grass is come, sheep leave off eating it. It becomes hard, and the tops turn brown, or a terminal flower, which begins to form very soon after the plant appears, hardens, and this the sheep don't like. Cattle will eat it later than sheep, and do well on it. If it were not for this tendency of running early to seed, and that other food come into season, sheep would no doubt continue to eat it longer than they do. It is thought to be better for producing flesh than milk. Burning such land is the best way of keeping it in good order, and this should be done early, for the same reason as in the case of nard.

Sweet vernal grass, *Authoxanthum odoratum*, is the next grass to come in spring after mat-grass, sending up its broad light-coloured green leaves through the old withered tufts, over nearly every description of hill land, about the end of April in an ordinary year. This is the grass which gives the sweet scent to natural hay. As its flowers and seeds are not eaten by sheep or cattle they may be seen all the summer through in natural pastures, mountain as well as lowland. The leaves are valued as food for both sheep and cattle, not so much on account of their intrinsic worth, as because they come early.

Blow-grass (a corruption of the Scotch Blae-grass) or purple Molinia, *Molinia cærulea*, springs a little later than the vernal grass, and is easily mistaken for it. It is not nearly so widespread, being more limited to a particular kind of black-topped or mossy soil—not too dry, if it is to grow in luxuriance. In spring it pushes up erect little green shoots, two leaves rolled together, which, on being pulled, break off easily, low down, close to the root, and draw up, the lower part quite white, like draw-moss. When young, the leaves, which come up like a "braird" of oats, especially after burning, are much eaten by sheep and cattle. Both fatten and do well on them, living in some places on little else for a month or more, and continuing all the summer to eat a part. On such land the animals are usually small-boned.

The leaves, when full grown, are broad, but thin, having little "body." When cut for hay, they wither and dry very quickly. In fine sunny weather it is no unusual thing to cut this "flying bent" in the morning, and put it into ricks in good condition in the afternoon. It has been successfully used for paper-making, but we are not aware that the practice is carried out at the present time. It is called "flying-bent," owing to the thin light leaves breaking off by the root, when they wither in autumn, and getting blown before the wind. These settle in drains, which get choked by this and the sand brought down by the next flood. This is a great nuisance on land where there is much blow-grass, necessitating each spring the regular looking to of drains stopped in this fashion. If not done regularly, the difficulty of cleaning out is much increased by another year, and the damages by sanding and flooding from such drains can not easily be estimated. Blow-grass land, if not mown, should be burnt every second year. The flower-head, which grows on a tall stem, is of a beautiful purple colour, giving origin to one of the names. The seed is used by seedsmen to adulterate the smaller sized seeds of natural grasses. It is, however, not grown for that purpose in this country. As a rule, it does not germinate; but it would make little difference, as on an ordinary agricultural soil Molinia would not find suitable conditions, and would very soon die out.

Tufted aira, *Aira cæspitosa*, is a very strong, coarse, rough-leaved, dark green grass, which grows in bunches or tufts. It is hardy, and able to resist the action of frost to a much greater extent than most grasses, so much so that, at any time all the winter, part at least of the centre of a tuft is green, and it is on this account that it is so valuable on some farms. The sheep are able in a storm to push their noses in among the withered roughness and get something they can eat. It is usually found growing on the better quality parts of hill land, as in good green hollows that are not too dry. It was to the roots of this grass among others that the vole did so much damage, on some of the Scotch Border farms, in 1876–77. The vole is a large, dark coloured mouse, with a short nose. Its work and habits were described by Sir Walter Elliot, in a paper published in the *Transactions* of the Berwickshire Naturalists' Club, 1879. As there has been no recurrence of the pest on a large scale, the facts, which were so alarming for a year or two, are now almost forgotten. The tufted aira is considered one of the most obnoxious weeds on the fine old permanent pastures of Lincoln and Cambridgeshire. Cattle and sheep both leave it when they have abundance of the finer grasses, and the consequence is it grows the stronger, and stands up giving an irregular appearance and want of uniformity of surface in graz-

ing, which is so much objected to on the better class of old pasture land. As summer advances on the hills, neither cattle nor sheep care much to eat the leaves of this grass, they become so hard and rough. Its great value is as a winter food. If cut early it makes excellent hay, and gives a large yield.

Many of the hardier natural grasses unite with the plants already mentioned to form a covering for the surface of the ground, but are a little later in the season before coming to much account. Among those we may name (occupying the land best united to each) Meadow Fescue, Sheep's Fescue, and hard Fescue, particularly the latter, which is often very abundant, on dry places as well as on land after draining. It has a large range of soil which it seems to consider suitable. Crested dogstail is another excellent hardy grass, which is often abundant; and the various Poas also make their appearance, as well as *Agrostis alba* or "Fiorin," the latter often to a large extent. On mossy land which has been drained and improved, Yorkshire fog, *Holcus lanatus*, may always be found. This can hardly be classed as one of the best grasses, only it is most valuable in this way, that it is often the only grass that will grow for a time on reclaimed moss. Fiorin, after a while, mingles with it on such a place, and other grasses come gradually as useful vegetable matter accumulates and the soil becomes richer. Yorkshire fog, however, taken as a hill grass, kept well down and eaten young, is not so bad as usually considered. Of plants that do good by merely covering the land, there is the little toad rush, *Juncus bufonius*, which springs up after draining, as it were spontaneously on those bare patches seen on level peat-moss land, which has been excessively wet from stagnation of surface water.

Thistles are by no means so objectionable on hill land as they are on an arable farm. Several varieties are found, eaten close down to the crown in hard springs, and are valuable, as most green plants are at that season. It is a well known fact that thistles are quite palatable to animals, and it is only because of the prickles that they are not eaten. When thistles are cut before they get too large, and allowed to lie in the sun for a few hours to wither, but not long enough to become hard, cattle pick them up and eat them greedily. Although we usually think of thistles as worthless weeds, they are highly and justly valued in places. In some districts of New Zealand, after thistle seed was imported, it was thought the whole country would be ruined by the obnoxious plant—it grew so luxuriantly and spread so wide—but in a few years it turned out to be one of the greatest blessings the country has seen; and the seed is now bought by those who can afford it at very high prices, and actually sown on land to be taken in. The plant grows enormously for a few years to the exclusion of everything else, and

then suddenly dies, leaving the soil much richer than before, and perfectly clean. The roots seem to bring up valuable plant food from deep down in the soil, and this, with the remains of the great vegetable growth on the top, raises the standard of fertility for years.

The leaves and young shoots of the blaeberry or bilberry plant, *Vaccinium myrtillus*, are in some districts much eaten by both Cheviot and blackfaced sheep during winter and spring. The plant is evergreen, and stands up so that sheep can get at it by scraping with their feet, even when there is a cover of snow. It is unfortunate, however, that it is usually found growing on or near the tops of high hills, where it is too stormy for sheep to remain at the very time it would be of most service; also I am assured on good authority, that in Wester Ross, where it is very abundant, sheep rarely if ever touch it, and that in Perthshire this is also the case. On the Dumfriesshire hills, on the other hand, where it is frequently found, it is kept close nibbled down. It may be, although I have not yet verified the fact, that the plant, as in some cases we have already alluded to, is so much altered by being grown under different conditions that sheep do not care for it.

The crowberry is another *Vaccinium*, which grows in high places, like its connection the blaeberry, but gets even less attention from sheep. There is no doubt, however, that sheep do eat it in part when hard up for food. Ptarmigan pick the young buds of this in the same way as grouse eat common heather.

It would be impossible and unnecessary to even name, in an article of this sort, all the plants found on hill pasture that sheep will eat. One or two more common or useful ones, and we have done: white clover, which grows most abundantly on dry land that has been limed: old-fashioned red clover, *Trifolium medium*, which we believe to be the true cow grass, but this is found only in certain districts: rib grass, which no doubt is of real value on hills, but has been over-rated in low pastures and is now often struck out of mixtures of seeds for good land: the bog asphodel, *Narthecium ossifragum*, which grows on very wet mossy land, and comes late in summer, is much sought after and eaten: eye bright, which has rather a peculiar though pleasant taste, and is no doubt taken more by way of a change or relish than as food: yarrow, with its astringent properties, may be put in the same class.

We have now mentioned or described all that we consider necessary of the plants usually found in hill pasture. It must not be supposed that all the different varieties are got on one farm, or even if found, that they exist in quantity sufficient to be of service to sheep. It is on account of the presence or absence of certain of these that a place gains the character of

being good or bad in spring or winter. The size and quality of a stock depends on there being a regular rotation of plants the whole year through, one set coming forward for use as the preceding one begins to decline.

It is the duty of the shepherd to keep his sheep regularly going in the way mountain sheep naturally incline, viz., up to the hill tops at night to lie, and down over the lower and usually sweeter feeding ground through the day. Sheep, especially Cheviots, sometimes get into lazy habits, and would remain all the while on the low grass lands. If allowed so to do, by carelessness or otherwise, they very soon injure themselves as a flock, and the death-rate increases; the best land becomes filthy, and the sheep do not have the varieties of food so beneficial to all classes of stock; and besides, mountain sheep if they are to thrive require exercise.

Another way in which sheep may go utterly to the bad, is seen in the disease termed "vanquish," on land overlying granite rock. If sheep are allowed to remain about the heights, as they sometimes naturally incline to do, and are not regularly turned down, so that they may have a thorough change of food, they become excessively poor, and die of sheer weakness. There is no organic disease, simply anæmia, and if taken to a good pasture and with a complete change, they begin to improve at once. The disease has not been properly investigated, and its actual cause is not understood. It is not the result of want of food, as is often supposed by those who have never seen it. It has something to do with the quality of food, no doubt, as it is only caused by herbage grown on granite land when sheep restrict themselves to a few varieties. We have known a farm, which was very subject to the disease, get quite clear of it by the sheep being made to run in large "hefts," and consequently travel over more land, and by burning all rough land which was not actually necessary for the sheep in spring.

Another advantage of good shepherding is, that sheep are turned into shelters in stormy weather, which in the end means food, as it saves them from falling off in condition. When once used to being taken to shelter, they will go themselves, if caught by a snowstorm at night or when the shepherd is taken unawares. Thus he knows where to find them. Shelters of various forms, made of high stone walls, are, or should be, built on all exposed farms. Some object to more elaborate shelters, such as plantations, because they say sheep lie there often when the weather is fine enough for them to be out gathering food, and thus spoil themselves. This would be the fault of the shepherd if allowed to occur. No doubt shelter is a great boon, and the better the shelter the more valuable. A man might as well say—"I won't have that 100 acres of really

fine old grass land at the bottom of my hill, because the sheep would be sure to lie too much on it and spoil themselves." All that he actually has to do is to see the shepherd attends to his duty, and the sheep will be much the better for it. An excellent method of securing warmth, which is much the same as shelter to lean sheep—useful also if there should be an excessive death rate in a flock from lung disease produced by parasites or any other cause—is, to cover their backs with cloth. For ewes ordinary canvass wrapping made waterproof by brushing on boiled linseed oil does well, cut into 2 feet squares, and sewed on firmly to the wool with stocking yarn.

Artificial Food.

The question, as to whether under any circumstances artificial food, such as corn, &c., should be given to hill sheep, has been long a subject of controversy, and is yet unsettled by the agricultural public. The facts stand thus. Certain lands have not a sufficiency of early growing plants, more especially in a backward year, to keep the usual stock of the place in good condition during the spring months. The consequence is, that the death-rate is frequently doubled, the crop of lambs lessened by half, and the constitutions of the living sheep are so shaken by being reduced in condition, that even the great advocates of non-feeding admit they take years to get over the evil consequences. The question then arises; are these consequences less serious than those that follow feeding? The answer will depend much on how the process is carried out. Injudicious and excessive feeding, though no doubt it might save the lives of those sheep that would otherwise die of poverty, and thus secure a good crop of lambs that year, might not, to speak of the expense incurred, leave the constitutions of the flock so changed for the worse that the result in time would be greater disaster than if they had been left to nature. This is the blackest side of the picture, and, though possible, would be difficult to bring about, and very unlikely to occur. Feeding highly, nevertheless, has a tendency to reduce constitution. There is, however, a middle course in this matter, which is the right one to adopt. What is wanted can be attained by a little trouble and forethought, viz., the "tiding" of hill sheep through hard cold winter and spring months by a sufficient, though not extravagant or excessive, aid in the shape of artificial food—enough to keep them neither improving nor falling off, but "at the bit," until nature finds the means of providing that which is more natural and congenial to them. When the feeding results in failure, the methods adopted in the actual giving of the food are often quite as much at fault as the quantity or quality given. It is too frequently the case,

that when any artificial assistance is supplied, the sheep are taken entirely from what natural food they could get, which no doubt was insufficient in itself, but only required to be slightly aided to be all that was wanted. Taken from a hill, and put into a bare pasture field, that had perhaps only a few sheltered places to recommend it, sheep require, to keep them even from falling off in condition, more than twice the amount of corn, &c., that would have guaranteed their doing well, had it only been used as a supplement to the natural food. A short time of this treatment, while it is positively necessary, as during a snowstorm, will do little harm, as we shall see further on; but to continue it for weeks or months together, as is often done in the case of lean sheep drawn in from the hill, is certainly a mistake. Their constitutions which were weak before from some cause, are not improved, as is seen the following spring when all of the lot are found again amongst the lean sheep, and requiring to be in earlier than before. This is perhaps the strongest argument which the advocates of non-feeding can bring forward. They do not see that there are two reasons why it goes to prove nothing against feeding properly conducted, and is consequently most misleading. Firstly, the experiment is made with sheep which have something soft about their constitutions originally and were poor in consequence before ever they were fed; and secondly, the food given is not supplied under suitable and proper conditions. The sheep either have it in too great quantity, if it is intended to keep them up at the time when insufficiently provided with their usual natural and bulky food; or, on the other hand, if they are given too little concentrated food as well as too little bulky food, they are starved. Again, if the feeding is done on the hill, which is not so frequently the case, the worst place possible is selected, viz., on the low-lying land. This brings the sheep down away from their feeding ground, and there they incline to remain until spoiled, as in the manner previously explained. They have been taken, this time, however, by their own freewill, from the food which is natural to them, and which is not used in any other way. The actual loss sustained at the time is not the only disadvantage. Sheep treated in the above way get into the bad habit of flying to the low ground on the first appearance of snow or hard weather next year. There they spend valuable time looking for the feeding troughs, and foil (Scotch, file) the land in such a manner that when an actual storm does come, and they must of necessity be brought down, there is nothing worth having for them. Another very common practice is to stop feeding at a certain fixed date, say when lambing begins, regardless of whether there is a sufficient spring of grass or not. It is needless to say that feeding sheep well for a time and then starving them, is what no farmer

will admit is right, yet many do it without thinking, because it is not the custom to feed sheep on a hill while lambing. It is clear then, that, to be successful in giving hill sheep artificial food, they must only get it when they require it ; they must not have too much nor yet too little ; and they must have it given at such a time and in such a place as will enable and encourage them, not to neglect the natural food at their disposal, but be a stimulant to further exertions in the way of making use of even more of this than formerly. This can be done, and has been done by us successfully, and on a large scale for three years. The sheep practised on were about 1800 (mostly Cheviots) on the farm of Twiglees, Eskdalemuir ; and others on various places with which we had connection. In the case of Twiglees, had the stock been a good one and doing well, there might have been some risk in making such a great and sudden change as feeding so many sheep with artificial food. We had no fear from this, however, as nothing but very extraordinary management could possibly have made a stock do worse than it was doing under the old system before the farm came to our hands. As proof of this, I only require to say that between the time we got it—Whitsunday 1879—and weaning time, which was in the following September, 220 lambs died out of 1100 delivered to us; and the place was herded by the same men and stocked in the same way, as it had been for years before. The chances were therefore much in our favour that any change would be for the better; and it is gratifying to be able to say that we are pleased with the result. The sheep naturally go in distinct "hirsels" or lots, and it was thus an easy matter to have a certain number receiving no artificial food, and various other lots receiving different quantities; some were begun to be fed early in spring, some late; and the feeding of some stooped off before the grass had quite come, and of others continued until they could get a "full bite." It would load the paper, and be of no real good, to state the different exact amount given to A, B, or C lot of sheep; as in any case the effects on the stock must be judged of by ourselves.

The first opportunity we had of observing the effects of artificial food on hill sheep on an extensive scale was during the severe snowstorm of December 1873 which lasted for nearly a month, and begun to break up on New Year's Day. Everything was so covered up and plated over, by the snow partially thawing and then freezing, that sheep could not get down by scraping, except in some places which had steep heathery hill sides with a southern exposure. Then they were able to break through about the "heat of the day," and the snow naturally slipping down out of the way, they got at their food.

The sheep referred to consisted of about 3000 little Galloway

ewes—blackfaced and Cheviot. They were fed for about a week with natural hay cut from the hill, but on this being finished were brought down into a large, well-sheltered meadow, and fed (as nothing else could be had) entirely on oats and bran mixed—fully 1 lb. per head per day for quite a fortnight. It was considered not safe to give more of this concentrated food under the circumstances, but no doubt they would have eaten and been much the better for hay in addition. Some few would eat much more than their own shares one day, but nature cured itself, and these sheep were seen to have a slight scour and to hang back at feeding time, eating but little for a day or two after. Only a few lean sheep got corn during spring after the storm broke up. The after results were entirely satisfactory, although no one could say that the sheep looked to be doing well at the time under conditions so different from the natural ones. Their bellies got tucked up from want of bulky food. The spring throughout was mild and open, and the crop of lambs came quite up to an average. This was not the case with many sheep that were fed in the neghbourhood entirely on the best rye grass hay, at double the expense, though it was considered more natural. There was no general deterioration of constitution noticed, as the sheep did well in after years.

Before describing fully the method of feeding now adopted by us at Twiglees—being, as we give it, the outcome of all our experiences there and at other places—we give a short account of the four last spring seasons, with some account of the general plan of feeding. The spring of 1880 was a pretty good one, but with cold winds and sudden hard frosts at times. We began early (February) to feed a certain number of sheep, which have been fed regularly every spring since, except in 1882, which was a good season, and when they did not require it. Contrary to the expectation of many, the lambs of those sheep which had been fed regularly through the hard weather of 1880–81–83, were not only the best of all during the years they were fed, but the best as well in 1882, when none but lean sheep got artificial food, although, from the quality of their pasture, they ought not to have been so good as some others. Most of the sheep we thought of feeding in future were taught to eat from troughs in 1880, so that they would be ready to start at once when the time came.

In 1881 was a very bad spring. All the sheep were fed except those which have never had feeding at all, and with which we compare the others. As stated before, those that had been fed in 1880 did best. Of the remainder, the ones that were started to feed in February were next best, and the various lots gradually doing worse, as we were later in beginning the food: we could see no improvement on those which began artificial feeding in April,

as compared with those which got nothing. Again, the sheep which had feeding continued on through the early part of the lambing season (until "the grass," which was later than usual, came) were appreciably better than those which had begun to feed at the same time, but had been stopped feeding when lambing started.

The spring of 1882 was an excellent one, and sheep were as a rule quite able to do without feeding. Only a few lean ones were taken in to get corn. The lambs of those that were fed for two years not only topped the lot when drawn, but there were fewer small ones to come out, showing that the constitutions of the ewes had been saved.

1883—an open winter, with plenty of food, though rather wet. Sheep were in good condition up till the end of the first week of March. A vile month of east wind and hard frost followed, binding the draw-moss, which had begun to pull early, and withering up every green thing. In some places the snow was very deep, but with us there was little. The lean sheep, which had been in and feeding before the storm began, and were fed on through it, excepting those with bad constitutions, brought good lambs. Some lots on the hill were begun to be fed at once, and some later as the storm lasted. The sooner the feeding began the better was the result. Some that were fed only during two weeks at the end of the storm did better than those that had none.

These remarks apply to all of the sheep fed, with the exeption of one small "heft" of about 100, which, although it was well fed during the necessary time in 1881 and 1883, failed nevertheless to give the results expected of it and obtained from the others. The grain brought up the number of lambs to above the average of those not fed, but the quality was not up to the standard desired. We are inclined to believe that the comparative failure had to do with someting else than the feeding, as the "run" and "downfall" of this particular lot had been altered. Independently of this, we ought not to put too much weight on such a small test, when so much larger ones alongside of it have proved quite satisfactory.

Sheep, which have not been accustomed to eat from troughs while young, are at first afraid, but most will do so, in a few days, if a small number understand it, and show the way. Those that persistently refuse (and there are some would stand by for months and never learn by the force of example) require to be taken in, and a little grain put into each of their mouths, also keeping a trough with corn in the fold, into which they are again let loose to stand for an hour or so. This seldom requires to be repeated more than once or twice. The hoggs each year should be taught at the earliest opportunity, so that no time may

be lost when a storm comes. It is a well known fact, that sheep in good order will much more readily take to an entirely new kind of food than those in lean condition, or down in spirit from want of food. Having once learned, there is no further difficulty. To avoid as much as possible disturbing the usual habits of the sheep, we have the troughs carried out to convenient, sheltered positions on the high land close by the places where the sheep habitually lie at night. During a severe storm of snow it would be impossible or absurd to think of feeding so high up. We refer to the cold and backward weather which occurs often in winter and more particularly spring. When a good year comes we strongly believe in giving no feeding whatever, and our experience is, as we have already briefly stated, that the ewes we have taken most care of and fed most regularly during bad weather in previous years, those in fact which have never got down in condition, do best in seasons when they require no artificial food. This shows clearly that the constitution is preserved rather than injured by moderate feeding.

Feeding is done once a day—early in the morning before the sheep leave their resting ground, which they do a little later than usual on a frosty morning. The advantages of this time over any other are numerous. No extra "gathering" is required; the sheep lose no valuable time. After feeding they lie down for a short while to chew the cud, and are retarded from beginning to eat rimy grass on a frosty morning, which is hurtful to all sheep, but particularly to those under a year old, being the great means of inducing the disease called braxy, especially if the grass be "tath" or that dark-green luxuriant growth which springs from the droppings of animals, usually of cattle. They are further stimulated by the concentrated food to greater exertion through the day. Should the ground be plated by a frozen covering of snow, they are supported until it becomes soft, as noon approaches, then they work steadily till night, scraping away the snow as instinct directs them. The cattle of Europe will not scrape like sheep and horses, but starve where either of the others thrive. A little attention is required at first to prevent any sheep hanging about the troughs too long, but this is no great difficulty, as they are very easily trained if regularly reminded of their duties. Having rested for a short time, they spread out over the lower and better feeding ground, and have all day undisturbed to pick up what is to be had, returning as darkness sets in to dry elevations near to the troughs. After clipping, sheep naturally do this little tour daily, but for a while before that time are inclined to be lazy, and require more attention to see that they do it. During summer, from before lambing time (April in the north) until about the beginning of October, sheep do not as a rule rise at night to feed, but move at

day break; after October the day is not long enough to suffice, and they get up and feed from about eleven till two o'clock. On dark nights they don't travel far, but when the moon shines they often wander about a good deal. The troughs used are made of two $\frac{5}{8}$ inch spruce boards, 6 inches wide, nailed together, so as to make a box, the cross sections of which form a right angle; the ends being closed by triangular pieces cut from boards 1 inch thick. This box is sunk a distance of 3 inches (to keep the troughs low and partly to give strength) into two feet, which are made from planks 5 inches deep by 2 inches thick. The whole box, 9 feet long, weighs about 20 lbs.; one is allowed for twelve sheep. A good strong fellow can carry six of these at a time a short distance, when it is necessary to move them, as into shelter if the wind changes. They don't require to be brought home in summer, but are simply inverted and built up to keep them off the ground. If coal-tarred and regularly stacked up while not in use, they last for a good number of years. The advantage of the boxes being low is that sheep don't hurt themselves when they jump over, even when heavy in lamb. They are as much as possible, prevented from jumping by allowing them to approach by the ends of the troughs. These are placed end to end in rows 12 or 15 feet apart. A well-trained dog will easily keep the sheep off until the food has been put into the troughs. This allows all to start alike, and thus have a better chance of getting an equal share.

As soon as the sheep have left, the troughs are regularly turned over to keep them dry, prevent their filling with snow, and to let any dung which may have got in drop out. Sheep are most sensitive to smells, and will upon no account eat food that is near any filth in a trough. The amount given to each per day is about $\frac{2}{3}$ to $\frac{3}{4}$ of a lb.; of course, according to circumstances, this may vary a little, but we are certain it is not worth while giving less than $\frac{1}{2}$ lb., and more than 1 lb. comes to be unnecessarily expensive. We find it pays better to give a moderate quantity of food per day, extended over a considerable period, than to give the same amount in larger quantity per day extending over a shorter period. Mixed foods, in this as in other cases of feeding, give far better results than any one kind by itself. Bran we consider unnecessary when sheep have plenty of natural bulky food, and besides it is easily blown away by wind, or soaked, should it rain, so that sheep will not eat it. Cakes, as linseed or cotton cake, give quite as good results as grain, the only objection being their getting wet and disagreeable when it rains. Those foods we find to do best under any circumstances, which are not affected by either wind or rain during the short time they are exposed. Oats, peas, lentils, and Indian corn, either mixed all together, or two

together, one being either peas or lentils, have given excellent results. The actual mixture is determined by the relative prices, according to the feeding value of the suitable food substances in the market. We do not consider it dear if, calculating all carriages and charges, we have it on the spot at about 1d. per lb. This brings the cost per head, giving $\frac{2}{3}$ lb. each, if continued nearly eight weeks to 3s. Half this will be repaid in an ordinary year by the increased quantity and quality of the wool alone. We usually buy before Christmas what oats may be required, and should these not be all used up, we usually have had by selling in May, at least 6d. per bushel profit for storing.

For convenience, enough of the mixed food to suffice for a week or so is put into a strong wooden box or barrel, with the joints made water-tight by nailing along strips of leather cut from old cart harness, placed on dry ground, near each lot of troughs.

Sheep have been successfully fed by us on Indian corn, sown out on a clean dry and bare piece of ground; and we have known good results from locust beans given in the same way. Sheep soon learn to gather these off the ground. The practical difficulty of giving food thus is not easily overcome on an ordinary hill farm, although it may do very well in bare, hard fields, and besides, though better than no feeding, the best results can not be expected from such foods alone.

Turnips are so bulky and heavy, that to carry those on to a hill would be quite out of the question. Wether hoggs, that go off at three years old, do well to winter on them in the low country; but turnips are not at all suitable to give to ewe hoggs, as they have such an effect on the constitutions of hill sheep, if given before the sheep are a year old, that the greater number lose their incisor or front teeth about the age of four, which is serious where it is the custom to keep them till five years old or even more. It is a matter of little consequence with sheep in a lowland district, which are put away after having three lambs; as the alteration of constitution does not show itself in any other way than by the loss of teeth. It has been supposed by some, that the cause of the second teeth falling out so soon may be that the lambs break their milk teeth by biting the hard turnips; but this has been shown to have nothing to do with it, as the result is the same whether the turnips are given whole or cut.

We look forward to ensilage to supply a want long felt to hill sheep in a cold and barren spring, when nearly every green thing is withered up, but more particularly to ewes in lambing time, that are a little short of milk, and those that have to be shut up to get a lamb "twinned." Ensilage can be made by piling grass, spret, or any succulent grassy food, into a

close dry house, and loading the top with weights, to at least one cwt. per square foot of surface. Put in during summer, it would be in good condition the following spring, and could then be removed by cutting out narrow "dasses" every day or second day as wanted. It would be expensive to build a "silo" on a hill-side to store ensilage, but use might be made of many an old barn or other house to store sufficient to keep the sheep provided with green food whenever it is necessary to bring them down, as in a snowstorm. This would be supplying, at the very worst pinch, the bulky natural food which is considered of so much importance in our system of feeding. The large rumen of a sheep is injured if allowed to remain contracted for any considerable time from want of bulky food to distend it, and the sheep suffers from the after consequences of this as well as from getting into low condition. When sheep are unable to get anything for themselves, we strongly recommend, for the above reason, that chaffed hay be mixed with the concentrated food. Of course, ensilage would be much superior.

From all the experiences which have been detailed, we deduce the following conclusions:—

1. That it does not pay to feed hill sheep in good seasons, and that it would be a mistake to do so.

2. That feeding is necessary during a severe snowstorm, and better results are obtained by giving concentrated and bulky food together, than either separately; and that if the weather becomes mild after the snow melts, the sheep do well enough without further feeding.

3. That sheep do much better on some places in backward springs, when there is but little fresh growth, if supplied with a moderate quantity of concentrated food, judiciously administered, and this must not be stopped until a sufficiency of grass comes. We do not, however, forget that feeding is expensive, and requires some discretion to determine when such treatment will pay and when it will not.

4. That it will always pay well to feed very lean sheep, and that until grass has fully come. They should not be confined in a small bare place, however much food be given. On a large farm it works well to have a few hundred acres of enclosed rough land on which cattle can be grazed in summer, but not too late into autumn. It might then be used to shed ewes into beside a special ram, or it might be stocked in October with thin ewes (not necessarily the ones to come in next spring), or with small hoggs, if not subject to braxy. It should be cleared by New Year's day, and lean sheep shed in as they are noticed.

The present system of valuing hill farms, at so much per head of sheep as they stand before the valuer, without any

deduction being made for extra costs, is a decided discouragement to the adoption of a system that would in the end be a benefit, direct or indirect, to all classes of the community.

PART II.—By Professor EDWARD KINCH, F.I.C., F.C.S., &c.

Chemical Composition.

The composition and nutritive value of the important fodder plants of hill pasture specially mentioned in Part I. have been hitherto comparatively little studied. I am not aware that any analyses of British specimens have been published, although since the date of the late J. T. Way's classical paper on the composition of different natural and artificial grasses (*Journal of Royal Agricultural Society*, vol. xiv. p. 171, 1853) very numerous analyses of fodder plants have been published. Among the most important and useful of these papers may be mentioned the following:—by Ritthausen and Scheven (*Jahresbericht für Agricultur-Chemie*, 1859, p. 76); by Arendt and Knop (*Landwirthschaftlich Versuchs-Stationen*, 1860, p. 32), this includes ten sedges and rushes; also E. Wolff and J. Kühn have given tables showing the average composition of hay of many kinds, taken in the main from German sources. Within the last few years much useful work in the analysis of fodders has been done at some of the various Agricultural Colleges and Experimental Stations of the United States and by the Department of Agriculture, Washington. The results of the latter will be found in the Reports of the Commissioner of Agriculture. In that for 1878 is a report on grasses and forage plants by the chemist, Peter Collier, and the botanist, George Vasey. In this thirty-four analyses are given, including ash analyses; in the report for 1879 are given about ninety analyses of fodders, for the most part of specimens of wild grasses; in the report for 1880 are analyses of fifteen grasses and three leguminous plants, each at from two to five different stages of growth, and in addition thirty-seven other analyses of plants mostly in full bloom; in 1881–82 report are summaries of much of the work, with an average of seventy-seven analyses of wild grasses taken in bloom. In the latter years the albuminoid and non-albuminoid nitrogen have been determined separately.

F. H. Storer (*Bulletin Bussey Institute*, 1875, 1877, 1878) has analysed many fodder plants and weeds, including some *Carices*, *Juncaceæ*, and *Equiseti*.

The chemists of the Connecticut Agricultural Experiment Station, under the direction of Professor S. W. Johnson, has examined a large number of fodders; and Dr H. P. Armsby, of this station, has determined the amount of albuminoid and non-

albuminoid nitrogen in twenty-one samples of hay; the results of these analyses are given in the report of the station for 1879.

Oscar Kellner has investigated the nature of the nitrogenous matters in various fodders at different stages of growth and in hay (*Landwirthschaftlich Jahrbuch*, viii. suppl. i. 243, 1879; *Jahresb. Agricultur-Chemie*, 1879, p. 147). He estimated the amides and amido-acids by Sachsse's and Schulze's methods.

The specimens of which the analyses follow were collected by Mr J. R. W. Wallace of Auchenbrach. They were for the most part taken in May and June of this year 1883, though this was rather late for some of the plants. Only those plants, or parts of plants, which would have been eaten by sheep were taken for analysis. After collection they were immediately packed in damp cloth, and sent to the laboratory by post; on arrival the amount of water was determined at once by drying a sample at 100° C.; in this way the amount of water in the fresh plant was obtained within narrow limits.

The fibre was determined by the usual "acid and alkali" method of Henneberg and Stohman, which consists in boiling the dried grass first with a dilute solution of sulphuric acid, then, after filtering and washing, with dilute caustic soda, and washing thoroughly with hot water and with dilute solution of ammonia. The fatty or oily matter was obtained by extracting the dried grass repeatedly with ether. This yields not only true oil, but waxy and resinous matters, and more or less chlorophyll and other colouring matters; but little use can be made of this determination in considering the nutritious value of grasses, for the amount of matters not fat extracted by the ether varies much with different grasses, and even, though to a less extent, with the same grass at different stages of growth. In the case of the rushes examined but little foreign matter other than fat was extracted by the ether, whilst from the sedges and grasses, in most cases, much colouring matter, &c., was dissolved by the ether. The percentage of ash given is that of crude ash, obtained by burning the grass at a low temperature. The amount of silica in the ash was usually determined; in the case of the two rushes examined, it was less than 2 per cent., and in the ash of the blow-grass less than in that of most grasses, being about 13 per cent. The non-nitrogenous extractive matter was in all cases estimated by difference. The total nitrogenous matters were estimated by multiplying the total nitrogen obtained by a soda-lime combustion by 6·25.

The nitrogen in grasses and other fodder plants is not all in the form of albuminoids, but partly as amides, amido-acids, and sometime as nitrates, ammonia, and possibly other forms. These latter nitrogenous bodies do not fulfil the same functions as albuminoids in the nutrition of the animal body, and it is

therefore of considerable importance to estimate the amount of true albuminoids apart from the other nitrogenous matters. In most of the published analyses of fodders, except the most recent, the "albuminoids" have been estimated by multiplying the total nitrogen found by 6·25 or by 6·33. Many methods have been suggested for the separation of the albuminoids in foods from the other nitrogenous substances, with a view to their subsequent determination. Nearly all these consist in extracting the food with water or acidulated water, to which is added some substance known to coagulate and render insoluble albuminoids, whilst it is assumed that the whole of the amides and other nitrogenous matters pass into the filtrate; a nitrogen determination is then made in the insoluble portion. Church (*Laboratory Guide*, 5th edit., p. 229) proposes a 4 per cent. solution of carbolic acid with a little metaphosphoric acid; Ritthausen used copper sulphate and copper hydrate; Sestini (*Landwirth. Versuchs-Stationen*, xxiii. 305), lead acetate; Hoppe-Seyler and Schulze, ferric acetate; Hofmeister, lead hydrate; tannin has also been used; Stützer (*Journal für Landwirthschaft.*, 1880) proceeds by treatment with water containing a little lactic acid and precipitation of the dissolved albuminoids with copper hydrate. In some cases mere boiling with water appears to be sufficient to coagulate all the albuminoids, and this was found to be the case in some samples of hay examined by Armsby (*Rept. Conn. Expt. Station*, 1879).

In the fodders now examined the albuminoids were determined by Church's carbolic method and by the copper hydrate process (see Church's *Laboratory Guide*, p. 229). In all cases the results by the last process were slightly higher than those by the former; this may be due to the presence of a small amount of nitrogenous acid forming an insoluble compound with the copper hydrate.

The results of the analyses were as follows:—

GRAMINEÆ.

Aira cæspitosa, Tufted Hair Grass.

Percentage Composition.

Moisture,	69·18
Ash,	1·80
* Nitrogenous matter,	4·40
Fibre,	9·04
Ether extract,	1·14
Non-nitrogenous extractive matters,	14·44
	100·00
* Containing albuminoids by carbolic method,	3·77
„ by copper hydrate,	3·97

An analysis of this grass is given by Ritthausen and Scheven (*loc. cit.*); it contained about 1 per cent. less nitrogenous matter than this specimen.

Nardus stricta, Mat Grass.

Percentage Composition.

Moisture,	56·58
Ash,	2·37
* Nitrogenous matter,	6·05
Fibre,	13·52
Ether extract,	·63
Non-nitrogenous extractive matter,	20·85
	100·00

* Containing albuminoids by carbolic acid method,	4·15
„ by copper hydrate method,	4.37

Molinia cærulea, Blow Grass, Purple Melic Grass.

Percentage Composition.

Moisture,	69·82
Ash,	1·28
* Nitrogenous matter,	6·19
Fibre,	9·25
Ether extract,	·98
Non-nitrogenous extractive matter,	12·48
	100·00

* Containing albuminoids by carbolic acid method,	4·83
„ by copper hydrate method,	5·02

CYPERACEÆ.

Carex cæspitosa, Tufted or Common Sedge.

Percentage Composition.

Moisture,	68·26
Ash,	1·60
* Nitrogenous matter,	6·20
Fibre,	8·39
Ether extract,	·93
Non-nitrogenous extractive matter,	14·62
	100·00

* Containing albuminoids by carbolic acid method,	5·53
„ by copper hydrate method,	5·59

Carex panicea, Carnation Carex.

Percentage Composition.

Moisture,	67·73
Ash,	1·95
* Nitrogenous matter,	6·49
Fibre,	7·24
Ether extract,	1·18
Non-nitrogenous extractive matter,	15·41
	100·00

* Containing albuminoids by carbolic acid method,	5·63
„ by copper hydrate method,	5·75

Scirpus cæspitosus, Deer Hair, Tufted Scirpus, Scaly-stemmed Club-rush.

Percentage Composition.

Moisture,	68·52
Ash,	1·18
* Nitrogenous matter,	4·89
Fibre,	8·38
Ether extract,	·97
Non-nitrogenous extractive matter,	16·06
	100·00

* Containing albuminoids by carbolic acid method,	3·28
„ by copper hydrate method,	3·56

In another specimen 71·5 per cent. of moisture was found.

Eriophorum vaginatum, Draw-Moss, Sheathing Cotton Sedge, Hare's Tail Cotton Grass.

Percentage Composition.

Moisture,	74·46
Ash,	·83
* Nitrogenous matter,	3·51
Fibre,	8·17
Ether extract,	·18
Non-nitrogenous extractive matter,	12·85
	100·00

* Containing albuminoids by carbolic acid method,	3·40

JUNCACEÆ.

Juncus articulatus, Spret, Sharp-flowered Rush.

Percentage Composition.

Moisture,	82·09
Ash,	1·44
Nitrogenous matter,	2·45
Fibre,	4·82
Ether extract,	·19
Non-nitrogenous extractive matter,	9·01
	100·00

Juncus squarrosus, Stool Bent, Heath Rush.

Percentage Composition.

Moisture,	75·95
Ash,	1·39
*Nitrogenous matter,	2·62
Fibre,	7·25
Ether extract,	·24
Non-nitrogenous extractive matter,	12·55
	100·00

* Containing albuminoids by carbolic acid method, 2·19
„ by copper hydrate method, 2·25

An Analysis of *Juncus glaucus* is given by Way and some of *J. bulbosus* by Storer.

ERICACEÆ.

Erica (*Calluna*) *vulgaris*, Heather.

The young tops only were taken for analysis.

Percentage Composition.

Moisture,	65·4
Ash,	1·12
*Nitrogenous matter,	3·13
Fibre,	7·52
Ether extract,	2·87
Non-nitrogenous extractive matter,	19·93
	100·00

* Containing albuminoids by carbolic acid method, 2·66

The young heather shoots contain a good deal more water and less fibre, resinous matter, and other constituents than the more mature parts of the plant: they are less nitrogenous than most of the other foods: in the dry matter they contain less nitrogenous matter than any of the foods noticed, and less than half that of the *Carices* and *Molinia*. They are particularly rich in matters soluble in ether, more than 8 per cent. of the dry matter being so soluble. The indigestible fibre in them is lower, and the digestible non-nitrogenous matter higher than in the other foods.

The percentage of water in the mat grass is much lower than in the other fodders, and consequently the fibre and non-nitrogenous extractive matter higher. The *Molinia* is richer in nitrogenous matter than most grasses; the two species of *Carex* examined are also particularly rich in nitrogenous matter, about 20 per cent. of the dry matter of each of these three consisting of nitrogenous substance. The draw-moss contained less nitrogen than the other *Cyperaceæ*, but nearly the whole of it was albuminoid.

Summary of Results.

Composition of Fresh Plants.

	Moisture.	Ash.	Nitrogen. × 6·25.	Fibre.	Ether extract.	Non-nitrogenous extractive matter.	Albuminoids by Carbolic Acid method.	Albuminoids by Copper Hydrate method.
Aira cæspitosa, .	69·18	1·80	4·40	9·04	1·14	14·44	3·77	3·97
Molinia cærulea, .	69·82	1·28	6·19	9·25	·98	12·48	4·83	5·02
Nardus stricta, .	56·58	2·37	6·05	13·52	·63	20·85	4·15	4·37
Carex cæspitosa	68·26	1·60	6·20	8·39	·93	14·62	5·53	5·59
Carex panicea, .	67·73	1·95	6·49	7·24	1·18	15·41	5·63	5·75
Eriophorum vaginatum,	74·46	·83	3·51	8·17	·18	12·85	3·40	...
Scirpus cæspitosus,	68·52	1·18	4·89	8·38	·97	16·06	3·28	3·56
Juncus articulatus,	82·09	1·44	2·45	4·82	·19	9·01	...	...
Juncus squarrosus,	75·95	1·39	2·62	7·25	·24	12·55	2·19	2·25
Erica vulgaris, .	65·43	1·12	3·13	7·52	2·87	19·93	2·66	...

Composition of Dry Matter.

	Ash.	Nitrogen × 6·25.	Fibre.	Ether extract.	Non-nitrogenous extractive matter.	Albuminoids by Carbolic Acid method.	Per cent. of Nitrogen Albuminoid.*	Per cent. of Nitrogen Non-albuminoid.
Aira cæspitosa, .	5·86	14·12	29·26	3·72	47·04	12·25	86·73	13·27
Molinia cærulea, .	4·24	20·50	30·65	3·25	41·36	16·00	78·05	21·95
Nardus stricta, .	5·46	13·93	31·13	1·46	48·02	9·56	68·61	31·39
Carex cæspitosa, .	5·04	19·56	26·43	2·92	46·05	17·43	89·14	10·86
Carex panicea, .	6·04	20·12	22·42	3·68	47·74	17·57	86·84	13·16
Eriophorum vaginatum,	3·26	13·75	31·99	·73	50·24	13·35	97·09	2·91
Scirpus cæspitosus,	3·75	15·58	26·61	3·09	50·99	10·44	66·99	33·01
Juncus articulatus,	8·08	13·68	26·90	1·04	50·30	...	...	...
Juncus squarrosus,	5·77	10·90	30·17	·99	52·17	9·12	83·69	16·31
Erica vulgaris, .	3·24	9·06	21·74	8·33	57·63	7·69	84·83	15·17

* The percentage of albuminoid nitrogen is calculated from the results of the carbolic acid method.

In the mat grass and deer hair nearly one-third of the nitrogen was non-albuminoid, in the *Molinia* about one-fifth, and in the *Carices* about one-tenth to one-eighth was non-albuminoid. In the draw-moss the amount of ash constituents is low. As far as valuable nitrogenous matters are concerned, *Carex cæspitosa C. panicea*, and *Molinia cærulea* are the best of these fodders, and the heather shoots and stool bent the poorest. In heat-producing materials the heather shoots are the richest. In

the young rushes the percentage of water is high, and that of the other constituents correspondingly low. The amount of fibre is not greater than in the grasses. It is proposed to make a further study of one or two of these species and of others which are eaten, though to a less extent than these, by sheep.

REPORT ON AN EXPERIMENT FOR ASCERTAINING THE ACTUAL ADDITION OF WEIGHT TO FATTENING STOCK BY THE USE OF DIFFERENT KINDS OF FOOD.

By John Milne, M.A., King-Edward, Aberdeenshire.

[*Premium—Ten Sovereigns.*]

The Society directs the attention of experimenters to various roots, grains, oilseeds and cakes, and to the effect of warmth and proper ventilation, and the difference between food cooked and raw. In experimenting with oilseeds and cakes attention is directed to be paid to the comparative advantages, economically and otherwise, of the substances in those states. It is directed that, before commencing comparative experiments, the animals ought to be fed alike for some time previously, and that the experiments should extend over a period of not less than three months. It is specified that in the case of cattle no lot should consist of fewer than four, and that the animals selected should be of the same age, sex, and breed, and so far as possible of the same weight, condition, and maturity; and that the live weight, before and after the experiment, should be stated, with their dead weight also and tallow, if killed.

Cattle feeding is the most important industry in the north-east of Scotland. More than 1600 cattle, worth upwards of £50,000, in the highest possible condition, are sent alive annually from Aberdeenshire alone to the London Christmas market. Banff, Moray, Ross and other counties bring up the total annual supply from Scotland to the London Christmas market to from 2000 to 3000 head of cattle. The quantity of dead meat also which is sent to London during the Christmas market week is enormous. The trade in fat cattle is not by any means confined to this period of the year, but it is at this season that the northern farmers turn out the heaviest and fattest cattle. The London Christmas market, with prices ranging from 6s. per stone to 6s. 6d for the very choicest animals, stimulates them to put forth their utmost energy and skill, both as agriculturists and as breeders and feeders of cattle.

Christmas bullocks are sold at an average age of two years and nine months, and no sooner has the produce of one year been disposed of than their places are filled with animals a year younger. These are immediately put in process of preparation

for next year's Christmas market. During the remaining winter months they are fed upon turnips and straw, and in many cases they get also 1 or 2 lbs. of linseed cake or cotton-seed cake every day. In May they are turned out to pasture of the first year's growth—rye grass with a large proportion of red and white clover. In August or September, when the nights grow long and cold, they are taken indoors all night, and fed with green corn and tares or beans grown together. As soon as the turnip crop is ready for use, about the middle of September, they are tied up permanently. For the next three months they never leave their byres but for exercise. Highly fed cattle are apt to take sore feet if they are not turned out once a week to exercise their limbs.

The process of fattening now commences in earnest. The cattle feeder's mainstay is turnips. Each animal receives a daily allowance of 112 lbs.—perhaps less at first, but after a time even more. Straw also *ad libitum* is allowed. White and yellow turnips are given at first, because they are ready for use before swedes; but the latter are preferred as soon as they are mature, usually about the end of October. At first, turnips are given to the cattle with the tops on, because they contain a great amount of nutriment. As the season advances the tops are taken off, both because the nutriment in the leaves has descended into the roots, and also because as the cattle grow fat the daily allowance of turnips must be increased, and the tops having a laxative effect it is found desirable to take them off when a large quantity of swedes is given.

When cattle are taken in from summer pasture in good condition, they can be made very fat in the course of four or five months, upon a liberal allowance of topped swedes and straw, without the aid of extra food. Turnips, however, are not mature before the middle of September, and swedes not for a month later, and the London Christmas market is held in the middle of December, so that practically the stall-feeding of Christmas bullocks must be accomplished in the short space of three months. The consequence is that the feeders of the best class of cattle have to make use of some highly nutritious food in addition to turnips. The feeding stuffs most generally employed are oats, barley, and maize, among the grains; locust beans, tares and beans, among leguminous seeds; and linseed and cotton seed, among the oilseeds. These last two are generally used in the form of cakes made in the process of extracting oil from the ground seeds. Linseed oil is also used, but not often alone; generally it is mixed with ground grain.

Notwithstanding the great number of cattle fed annually, and the care and attention bestowed upon them, it is by no means a settled point what food or combination of foods is

most effectual in bringing cattle rapidly to maturity. Almost every feeder has his own favourite grain, or cake, or mixture, and it is rare to find that any two even among the most successful have adopted exactly the same foods.

With the purpose of helping to answer the question, "*What food, in addition to turnips and straw, has most effect in hastening the fattening of two-year old bullocks?*" I resolved to conduct some experiments on the lines laid down by the Highland and Agricultural Society. To attempt to settle the whole question by one set of experiments would probably result in settling nothing. I therefore determined to confine myself to one class of foods, and I fixed upon the oilseeds and the cakes made from them. I believe they are generally thought to be most useful, and therefore it is proper that they should be tried first. There is, moreover, a manifest mistake, in an economical point of view, in using both linseed oil and linseed cake for the same purpose, which it is desirable to correct. It cannot be economical for two men to buy a ton of linseed and pay a manufacturer to make it into oil and cakes, and then for the one to use the oil and the other the cakes for the same object. If both are equally efficacious, it would be more economical for them to divide the linseed and use it with the oil in it.

Like Mrs Glass of famous memory, I thought the first step to be taken was to procure the animals. After trying in vain for two years, I succeeded in getting together by the middle of April 1883 twenty bullocks tolerably uniform in age, breed, condition, and maturity. Their age was about two years; sixteen were pure black polled Aberdeen-Angus, and four were also polled, but first crosses between the shorthorn and the Aberdeen-Angus breeds. They were all in good condition, though hardly good enough for making first-class Christmas bullocks of. The cattle I arranged to divide ultimately into four lots of five in each, but for three months they fed together in a field of new grass. They throve well, but as they seemed likely to be scarce of grass before the end of summer, I put some nitrate of soda on the field. This soon brought up a luxuriant growth of grass, which they relished very much; being succulent, it proved rather laxative for them.

My next care was to provide a suitable weighing machine. An Edinburgh firm undertook to supply a machine to weigh carts or cattle for £19, 10s. free on rail or ship. I intended to commence my experiment in July and to conclude it before the first day of November, but unfortunately the weighing machine was broken on the way from Edinburgh, and did not arrive till the end of August. I also provided a spring machine, weighing up to 14 lbs. for the food. Both suited the purpose intended admirably.

The food stuffs I selected for experimenting with were linseed and linseed cake, cotton seed and cotton-seed cake. In order to make the results as trustworthy as possible, I used these both singly and along with maize in various proportions. The daily ration of each animal was fixed at 5 lbs., according to the following scheme :—

Lot I.

No.	lbs. Linseed.	lbs. Maize.
1	5	0
2	4	1
3	3	2
4	2	3
5	1	4

Lot II.

No.	lbs. Linseed Cake.	lbs. Maize.
1	5	0
2	4	1
3	3	2
4	2	3
5	1	4

Lot III.

No.	lbs. Cotton Seed.	lbs. Maize.
1	5	0
2	4	1
3	3	2
4	2	3
5	1	4

Lot IV.

No.	lbs. Cotton-Seed Cake.	lbs. Maize.
1	5	0
2	4	1
3	3	2
4	2	3
5	1	4

The linseed was fine clean Calcutta seed, and cost £13, 10s. per ton in Aberdeen, ground. It contained 40 or 50 per cent. of oil. The linseed cake was prime Western American, and cost £8, 10s. per ton in Glasgow. It was chosen because, though of good quality, it contained little oil—only 8 per cent. The cotton seed was Egyptian, and cost £9 per ton in Hull. It contained 19 per cent. of oil. The cotton-seed cake was best New Orleans, and cost £7 per ton in Aberdeen. I found that it contained 15 per cent. of oil. The maize cost £7, 5s. per ton, whole, in Aberdeen. It contained 5 per cent. of oil. All the foods were of the best quality of their respective kinds, and perfectly fresh and sound, as was testified by the smell and taste of the oil in them when extracted by ether. The first supply of seeds I took whole, the better to judge of their quality, and I had them ground by a local miller.

At the first of August, having everything in readiness but the weighing machine, I resolved to make a beginning. The twenty cattle were taken indoors, tied up, and carefully measured. By the aid of Ewart's cattle gauge an estimate was formed of their carcass weight, and the sixteen pure polls were arranged in four lots of four each as fairly as possible. The best animal in each lot was marked No. 1, the next No. 2, a cross-bred poll was made No. 3, the third best pure poll No. 4, and the worst No. 5. By this arrangement the best animals in each lot had 5 lbs. each of oilseeds or cakes without maize, and could be compared with one another; the cross-bred animals had each nearly an equal quantity of oily foods and maize; and the worst animal in each lot had more maize than oily foods. In this way I hoped to bring out more striking and trustworthy results. To induce the bullocks to enter their byre readily, a supply of tares and beans was placed in their stalls early in the evening, and after they had consumed the green food each had put before him his allowance of experimental food. Half an hour was allowed for making an acquaintance with this, after which they were turned out for the night. The first evening very few of them did more than smell at their food. Next day several took a little, and in the course of a week almost all ate about half of their allowance. Some, however, would not taste it of their own accord, and handfuls of it had to be put into their mouths before they would begin to eat of it. By the end of a fortnight all were taking their food fairly well, and continued to do so throughout the remainder of the experiment. Some animals occasionally left part of their food.

At the end of a fortnight I measured again each one's length and girth, and estimated his carcass weight. Errors in the first measurements were corrected, and by continuing the process every fortnight the length, girth, and estimated weight of each bullock came to be known very exactly.

By the end of August the weighing machine arrived, and no time was lost in putting it into operation. The platform is similar to that of an ordinary cart-weighing machine, with three holes at either side, into which movable guards can be placed. The animal to be weighed is placed upon the platform, and kept in position by a small chain connecting the side guards before and behind. A graduated steelyard projects at one end at the level of the ground, and the weight is found by sliding weights.

The first weighing was a tedious and almost hopeless process. None of the bullocks had ever been haltered before. Some pulled and tugged, rushing from side to side, and were got upon the platform with great difficulty; but worse than the obstreperous were the quiet ones, that came so far without

trouble, and then obstinately refused to move another step. Neither progging nor whipping had any effect. Move they would not, till by main strength they were shoved into position. A few went down upon their knees, and could only be brought to their feet by shouting in their ear. By patient perseverance the weighing was accomplished, and it was repeated every fortnight at the same hour of the day, 2 P.M., with less and less trouble. By the end of three months I could take the weights of the whole in an hour.

During August and part of September, the cattle were out all day, and in going about amongst them after heavy rain had fallen, I found I could tell by the droppings what each one's food had been. Here were shells of linseed still smelling of oil, there the hard brown hulls and tufts of wool told of cotton seed; and everywhere specks of maize were visible. It was evident that much of the food was passing through the animals without being digested. This might have been remedied to some extent by steeping the food in water for twenty-four hours before using it, but it would have added considerably to the work, already heavy enough, connected with the experiment. The second and subsequent supplies of food were procured finely ground, and the evil was thereby lessened if not entirely cured. That all the oil in the linseed was not digested, even with fine grinding, was manifest from the smell of the dung of lot No. 1. The odour of linseed oil was quite perceptible amongst them after they were tied up.

At the beginning of September, the cattle were kept indoors all night, and when yellow turnips became fit for use a week or two later, they were kept in both day and night. Want of exercise and high feeding brought sore feet on some of them, and this took away their appetites for a time. When a bullock had sore feet at weighing time, he often proved lighter than at previous weighing. It seemed, however, that the reduction in weight was due more to having eaten less for a few days, than to reduction in carcass weight. Still an animal suffering from sore feet cannot make progress, and to ward off this ailment the cattle were turned out for exercise once a week, and with benefit. Otherwise they were kept tied up till they left for London on the 13th December.

From the middle of September to the middle of October, they had each, besides the 5 lbs. of experimental food, 1 cwt. of turnips, and as much straw as they could consume.

During the rest of the time they were fed with swedes not topped. The crop of 1883 was later than usual and not so good, and the weather being fine, reasons of economy prevented the topping of the turnips and swedes so early as usual. In the end of November it was seen that the cattle would not attain to

the utmost degree of fatness before they must be sold, and the allowance of swedes was raised to 1¼ cwt. per day, with a decided increase of the rate of fattening. The daily consumption of straw was about 12 lbs. a head; the first lot, however, which were getting linseed, consumed about 2 lbs. a head more than the others. This is rather remarkable. Mr Warington and other experimenters have observed that cattle receiving linseed in addition to other food consume less straw than usual. Perhaps these bullocks consumed more turnips than those which Mr Warington experimented with.

On the 8th December the bullocks were measured and weighed for the last time. They were sold the same day for £600, at 82s. per cwt. of estimated carcass weight, and a few days after they left for the London Christmas market. In estimating their weight and value, no dependence was placed upon their live weight, but the estimate was based upon their length and girth and degree of fatness. The average length was over 4 feet 9 inches, the average girth was 6 feet 10 inches, and they were reckoned to have a carcass weight of 58½ stones of 14 lbs. or 7 cwts. 1 qr. 7 lbs. The average actual live weight was 101¼ stones, or 12 cwt. 2 qrs. 17½ lbs. The ratio of the estimated carcass weight to the actual live weight is therefore 57·77 per cent.

The increase or decrease in live weight, between one measurement and another, was most instructive, and I should not now like to want a weighing machine to show at once the improvement or falling off in fattening and growing stock. Too much must not, however, be expected of a weighing machine. It may serve as a correct indicator of progress or the reverse, but not of comparative value. The live weights of two fat cattle may differ, while their estimated dead weights are the same, and *vice versa*. Something depends upon individual peculiarities not visible to the eye during life, but more upon good or bad appetite and digestion, which may go together in the proper way, or not. After fat stock have been kept without food and water for a day or two the ratio of carcass to live weight becomes much higher, and probably also becomes more nearly equal among a number of cattle than it was when upon full food.

It now only remains to give in a tabular form the particulars noted regarding each animal at the beginning of the experiment on August 31, and at the end on December 8, 1883. They are given in two ways—first, arranged according to the kinds of oleaginous foods, and second, according to the quantities of these and of maize.

No. 1 frequently left part of his food, and would have preferred linseed and maize to pure linseed. At the close he was soft and fleshy.

No. 2 sometimes left about a pound of his food; he made but little progress in September.

No. 3 had to get his food put into his mouth for some days before he would eat of it.

No. 6 suffered from sore feet, and weighed the same on November 17 as on October 20. He would probably have gained three stones more if he had not become ill with his feet. He became very fat ultimately.

No. 7 occasionally left a pound of his food.

TABLE I.

I. *Linseed.*

No.	Food.		Girth.			Length.			Live Weight.		
	Oleag.	Maize.	Beg.	End.	Incr.	Beg.	End.	Incr.	Beg.	End.	Incr.
	lbs.	lbs.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	st. lbs.	st. lbs.	st. lbs.
1.	5	0	6 8	7 1	0 5	4 7	4 10	0 3	93 12	107 10	13 12
2.	4	1	6 5½	6 10	0 4½	4 7½	4 9	0 1½	93 8	100 10	7 2
3.	3	2	6 0½	6 8	0 7½	4 4½	4 8	0 3½	76 4	94 0	17 10
4.	2	3	6 5	6 9	0 4	4 5	4 8	0 3	86 8	98 10	12 2
5.	1	4	6 4	6 8	0 4	4 7	4 10	0 3	86 12	99 0	12 2
			31 11	34 0	2 1	22 7	23 9	1 2	437 2	500 2	63 0
II. *Linseed Cake.*											
6.	5	0	6 6½	6 10½	0 4	4 7	4 10	0 3	97 7	107 10	10 3
7.	4	1	6 5½	6 11½	0 6	4 7½	4 10½	0 3	91 1	104 3	13 2
8.	3	2	6 1½	6 7	0 5½	4 6	4 9½	0 3½	82 2	99 0	16 12
9.	2	3	6 5	6 8½	0 3½	4 7	4 10	0 3	91 4	100 7	9 3
10.	1	4	6 4½	6 10	0 5½	4 4½	4 7	0 2½	83 12	96 3	12 5
			31 11	33 11½	2 0½	22 8	23 11	1 3	445 12	507 9	61 11
III. *Cotton Seed.*											
11.	5	0	6 5	3 9½	0 4½	4 8	4 10½	0 2½	92 4	105 0	12 10
12.	4	1	6 5	6 10	0 5	4 6½	4 9	0 2½	91 0	99 7	8 7
13.	3	2	6 4	6 10	0 6	4 7½	4 9½	0 2	89 10	102 0	12 4
14.	2	3	6 4½	6 10	0 5½	4 6½	4 9½	0 3	90 7	106 7	16 0
15.	1	4	6 4	6 8½	0 4½	4 6	4 8½	0 2½	86 1	95 0	8 13
			31 10½	34 0	2 1½	22 10½	23 11	1 0½	449 8	508 0	58 6
IV. *Cotton-Seed Cake.*											
16.	5	0	6 5½	6 9½	0 4	4 7	4 8½	0 1½	91 13	103 10	11 11
17.	4	1	6 6½	6 11½	0 5	4 6½	4 8½	0 2	89 2	104 4	15 2
18.	3	2	6 7½	7 0	0 4½	4 7	4 10	0 3	92 6	105 7	13 1
19.	2	3	6 5½	6 10½	0 5	4 5½	4 7½	0 2	86 10	99 7	12 11
20.	1	4	6 1½	6 7	0 5½	4 6	4 8	0 2	83 1	98 0	14 13
			31 2½	34 2½	2 0	22 8	23 6½	0 10½	443 4	511 0	67 10

No. 9 suffered from sore feet, and made no increase in weight from September 28 to November 17. He probably would have gained three stones more had he continued in good health. He had an eruption upon him at the end.

No. 12 made little progress in October.

No. 14 became the fattest.

No. 19 made no progress in weight in September, but he grew an inch in girth during that month.

No. 2 made least progress, and No. 3 most. The former was always itchy and uncomfortable, the latter was very quiet. He was a first cross.

I append other two tables (III. and IV.), showing according to the same arrangement as I. and II.—first, the value of the foods,

TABLE II.

No.	Food.		Girth.			Length.			Live Weight.		
	Oleag.	Maize.	Beg.	End.	Incr.	Beg.	End.	Incr.	Beg.	End.	Incr.
	lbs.	lbs.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	st. lbs.	st. lbs.	st. lbs.
1.	5	0	6 8	7 1	0 5	4 7	4 10	0 3	93 12	107 10	13 12
6.	5	0	6 6½	6 10½	0 4	4 7	4 10	0 3	97 7	107 10	10 3
11.	5	0	6 5	6 9½	0 4½	4 8	4 10½	0 2½	92 4	105 0	12 10
16.	5	0	6 5½	6 9½	0 4	4 7	4 8½	0 1½	91 13	103 10	11 11
			26 1	27 6½	1 5½	18 5	19 3	0 10	375 8	424 2	48 8
2.	4	1	6 5½	6 10	0 4½	4 7½	4 9	0 1½	93 8	100 10	7 2
7.	4	1	6 5½	6 11½	0 6	4 7½	4 10½	0 3	91 1	104 3	13 2
12.	4	1	6 5	6 10	0 5	4 6½	4 9	0 2½	91 0	99 7	8 7
17.	4	1	6 6½	6 11½	0 5	4 6½	4 8½	0 2	89 2	104 4	15 2
			25 10½	27 7	1 8½	18 4	19 1	0 9	364 11	408 10	43 13
3.	3	2	6 0½	6 8	0 7½	4 4½	4 8	0 3½	76 4	94 0	17 10
8.	3	2	6 1½	6 7	0 5½	4 6	4 9½	0 3½	82 2	99 0	16 12
13.	3	2	6 4	6 10	0 6	4 7½	4 9½	0 2	89 10	102 0	12 4
18.	3	2	6 7½	7 0	0 4½	4 7	4 10	0 3	92 6	105 7	13 1
			25 1½	27 1	1 11½	18 1	19 1	1 0	340 8	400 7	59 13
4.	2	3	6 5	6 9	0 4	4 5	4 8	0 3	86 8	98 10	12 2
9.	2	3	6 5	6 8½	0 3½	4 7	4 10	0 3	91 4	100 7	9 3
14.	2	3	6 4½	6 10	0 5½	4 6½	4 9½	0 3	90 7	106 7	16 0
19.	2	3	6 5½	6 10½	0 5	4 5½	4 7½	0 2	86 10	99 7	12 11
			25 8	27 2	1 6	18 0	18 11	0 11	355 1	405 3	50 2
5.	1	4	6 4	6 8	0 4	4 7	4 10	0 3	86 12	99 0	12 2
10.	1	4	6 4½	6 10	0 5½	4 4½	4 7	0 2½	83 12	96 3	12 5
15.	1	4	6 4	6 8½	0 4½	4 6	4 8½	0 2½	86 1	95 0	8 13
20.	1	4	6 1½	6 7	0 5½	4 6	4 8	0 2	83 1	98 0	14 13
			25 2	26 9½	1 7½	17 11½	18 9½	0 10	339 12	388 3	48 5

consumed in fourteen weeks by the different lots—cash prices at places of import; secondly, the actual increase in live weight; and thirdly, the estimated increase of carcass weights, calculated from length and girth and degree of fatness. Little importance should be assigned to these, yet they indicate that cotton seed made a high increase of carcass weight, though the lowest increase of live weight; while, on the other hand, cotton seed cake made the lowest increase of carcass weight, though the highest of live weight. In the fourth table, while the increase of live and estimated carcass weights correspond fairly well in all the lots, yet the middle is the only one in which the increase of estimated carcass falls below the increase of the actual live weight.

Table III.

Lots.	I.	II.	III.	IV.
Val. Ol. Food,	177/	111/6	118/	90/
Do. Maize, .	63/	63/	63/	63/
Total, .	240/	174/6	181/	153/
Incr. L. W., .	63 st. 0 lbs.	61 st. 11 lbs.	58 st. 6 lbs.	67 st. 10 lbs.
Incr. E. C. W.,	67 7	66 7	66 7	62 7

Table IV.

Lots.	I.	II.	III.	IV.	V.
Val. Ol. Food,	166/	133/	100/	66/	33/
Do. Maize, .	...	25/	50/	75/	100/
Total, .	166/	158/	150/	141/	133/
Incr. L. W.,	48 st. 8 lbs.	43 st. 13 lbs.	59 st. 13 lbs.	50 st. 2 lbs.	48 st. 8 lbs.
Incr. E. C. W.,	51 0	50 7	56 0	53 0	52 7

From a consideration of the whole results, and taking into account the fact that No. 6 and No. 9 suffered from sore feet, I draw the following conclusions:—

(1) That the difference in increase of weight, due to the difference in kind of the oleaginous foods experimented with, is insignificant, compared with the difference in price of these foods, and hence—

(2) That decorticated cotton seed cake is the most economical for fattening cattle.

(3) That cross-bred cattle increase faster in live weight than pure polled black cattle, but—

(4) That in pure polled black cattle the ratio of increment of carcass weight to live weight is greater than in cross-bred cattle.

(5) That there is room to suspect that the efficacy of oleaginous foods is over-estimated.

TREES TO BE LEFT AS STANDARDS IN CUTTING DOWN PLANTATIONS.

By John B. Webster, Glasgow.

[*Premium—Five Sovereigns.*]

In cutting down and remodelling plantations, two things ought to be always kept in view, namely, utility and scenic effect, so that the trees, grasses, and forage plants left on the ground or introduced may be of such species and varieties as have proved to be best fitted for the particular soil and situation in which they are intended to occupy. By following up this rule, and acting upon it, we will thereby be going hand in hand with nature, assisting her in her operations, and by so doing we have every reason to believe that our efforts will be crowned with a fair measure of success.

It is astonishing what nature can accomplish in the way of clothing the surface of the earth, even under adverse circumstances, with plants of her own choice and selection; and by studying her unerring ways in this respect, we shall unfold to view a subject which is not only interesting but highly instructive, and well worthy of our closest attention in this important branch of estate management, and in illustration of which we shall give a few practical examples.

No. 1 is a series of natural plantations on the estate of Balmoral, Aberdeenshire, composed of birch (*Betula alba pendula*), common sallow (*Salix caprea*), alder (*Alnus glutinosa*), aspen poplar (*Populus tremula*), mountain ash (*Pyrus aucuparia*), and common juniper (*Juniperis communis*). The soil consists principally of poor thin gravelly loam, resting upon drift and rough shingle, at an elevation above sea-level ranging from 872 feet up to about 1000 feet. In cutting down, thinning, and opening up vistas here and there for the improvement of the pasture, a portion of all the above named trees were left as standards for the sake of contrast and variety.

The following list comprises the principal grasses and forage plants found to thrive best under such conditions in the locality :—

(1) Rye grass (*Lolium perenne*) is a hardy fibrous-rooted grass, and although not permanent, yet we have found it to thrive and grow freely under the shade of trees, and forms a green sward while it lasts, and until such time as the more permanent grasses are developed.

(2) Smooth-stalked meadow grass (*Poa pratensis*) is a hardy creeping-rooted grass, and well adapted for all dry light soils at a high elevation. It is not apt to get burned up by the heat of summer, and thrives well among trees.

(3) Hard fescue (*Festuca duriuscula*), this grass thrives on a great variety of soils and situations, but is most at home on dry light land thoroughly drained. It is early, and forms a green nutritious sward during winter, and is not apt to get burnt up in summer.

(4) Sheep's fescue (*Festuca ovina*) is one of our best natural grasses for permanent pasture on high elevations; it grows in tufts, and thrives among trees when not too crowded. In autumn, when the trees shed their foilage, the leaves settle down on the surface between the tufts, and when they get decomposed they leave a thin layer of leaf mould around the plants, which has a beneficial effect in promoting its early growth, and rendering it sweet and succulent.

(5) Quaking grass (*Briza media*) is a small perennial indigenous grass, grows in tufts under trees and elsewhere, and is relished by sheep and cattle.

(6) Wood-meadow grass (*Poa nemoralis*), this grass is both strong and hardy, thrives on poor soil under the shade of trees, and gives a good return on places where some of the finer grasses die out.

(7) Cocksfoot grass (*Dactylis glomerata*) is one of our best and most productive grasses, and thrives on a great variety of soils and situations, providing that they are thoroughly dry, and not liable to be flooded during winter. Its habit of growth is in large conical tufts, the leaves are strong and of a rich bluish green colour, very nutritious, and much relished by cattle, sheep, and deer. It is very suitable to be grown here and there on dry sheltered patches in the deer forest, as it affords the animals a bite in stormy winter weather when the finer grasses are quite bare. It has been said by some, that this grass dies out after being depastured for a period of some six or eight years; this, however, is not the writer's experience, as I have known it to grow along with other grasses in plantations under my charge for a period of eighteen years, and never saw any appearance of its failure.

(8) Soft grass (*Holcus lanatus*), the only merit which this species possesses is its extreme hardiness, as it grows on the poorest of soil, and in places where the finer grasses would perish

(9) *Holcus mollis* is another inferior grass; it has a creeping root, grows in tufts, the leaves of which are covered with soft downy hairs, and all grasses of this character are inferior, and only fit for poor exposed situations.

(10) White clover (*Trifolium repens*) is a well-known hardy plant, and grows naturally on a great variety of soils, and is perfectly at home on poor gravelly soils in plantations where the trees are not too much crowded.

11. Birdsfoot trefoil (*Lotus corniculatus*) is another hardy natural plant; it grows freely on dry banks and poor gravelly soil, and is much relished by sheep.

(12) *Lotus decumbens* is a hardy useful plant; inhabits dry fields and pastures.

(13) *Lotus major* is likewise a valuable plant, and thrives on a variety of soils and damp situations in woods and elsewhere.

14. Goats' beard (*Tragopogon pratensis*), grows on poor sand, dry gravel, and mossy banks, and affords a picking for sheep where other plants have failed to establish themselves.

(15) Yarrow (*Achillea Millefolium*) is another hardy perennial plant, whose home is on dry gravelly banks, and rocky places thinly covered with soil. It affords an early bite for sheep in spring, and is a hardy useful plant.

(16) Ladies' mantle (*Alchemilla vulgaris*) is quite at home among trees, on dry gravelly soil, and is a valuable forage plant.

(17) *A. alpina* is a small hardy plant, inhabits dry gravelly ground, and is nibbled by sheep.

(18) Earth-nut (*Bunium flexuosum*) is at home on dry gravelly or sandy ground, in plantations where most grasses refuse to grow. It is a small sweet plant, and relished by sheep.

(19) Meadow sweet (*Spiræa Filipendula*) is a hardy useful forage plant, thrives on dry, poor elevated pastures, and in plantations.

(20) Daisy (*Bellis perennis*), this hardy little plant grows naturally on all classes of soils and situations, and is so well known that any descriptive particulars are unnecessary.

The above list comprises the most useful grasses and herbage plants found in the locality, and found most suitable for the soil.

When the trees were felled, the timber was at once carted off the ground, and all worthless branches and rubbish collected and burned up and the ashes spread over the surface, and the following mixture of grass seeds were then sown broadcast on all bare places :—

	Per acre.
Perennial rye grass, ...	10 lbs.
Smooth-stalked meadow grass, ...	5 „
Hard fescue, ...	5 „
Sheep's „	8 „
Wood meadow grass, ...	4 „
Cocksfoot, ...	5 „
White clover, ...	3 „
Birdsfoot trefoil (*Lotus major*), ...	2 „

As it is sometimes dangerous to use grass seed harrows for covering the seeds among the trees, on account of the roots catching the tines, the writer has used bundles of branches tied together, and by dragging them several times over the surface all that is required for covering the seeds are attained without risk. The ground may then be rolled with a heavy roller, which will not only smooth and level the surface, but also render it firm to resist drought.

At different places here and there, where poplar trees were left as standards, a great many suckers from the latter made their appearance with the young grass, and as these are much relished in either a green or dried state by sheep and cattle, they form a valuable addition to the useful forage plants of a Highland estate. The writer has been in the practice for many years of cutting these shoots along with the grass, and making them into hay together, the after grass being depastured by sheep.

When building the hay into a stack in autumn, my practice has been to sprinkle a little salt over each layer of hay as the building proceeds, say about $1\frac{1}{4}$ stone of salt to each ton of hay. This has the effect of checking too rapid fermentation, destroys the spores of poisonous fungi, kills insects and destroys their eggs, and renders the hay sweet, palatable, and nutritious.

No. 2.—In cutting down Scotch fir plantations on exposed heather moor ground at high elevations, the latter species of tree answers admirably to be left here and there for standards, as they not only afford a certain amount of shelter, but the heather in such places is generally green and tender, and in a time of frost and snow it stands up against the blast, and is not so easily covered up and pressed down as grass, by which means it affords a valuable run for sheep and store cattle in winter and spring, when pastures are bare and feeding scarce, all of which put together is not only conducive to the animals' health, but also forms an important item of economy.

Scotch firs in such a position soon reproduce themselves from seeds, but as long as the ground is depastured by sheep and cattle, they eat down the young plants as soon as they appear among the heather, and at this stage of their growth they are valuable as forage plants.

Should it be desirable, however, at any time to convert the ground into a forest of young trees, the sheep and cattle have only to be withdrawn, the standard trees cut down and removed (if wanted), and the ground properly fenced to protect the young progeny, by which means the surface will soon get stacked with fine healthy young trees, and prove a valuable addition to the forest without further trouble or expense.

At the time this property belonged to Lord Fife, a great deal of the present pine forest was reproduced in this way.

No. 3.—The larch is in many parts of the country rather a precarious crop, but where it does thrive there is no tree with which the writer is acquainted better suited to be left as standards to assist in the development of our natural grasses. The larch, when it sheds its foliage in autumn, deposits a rich fertilising coat over the surface in as regular a manner as a thin coating of snow, the small needle-shaped leaves settle down among the grass and are permanently fixed, and are not liable to be blown off by the wind, as is the case with the leaves of deciduous trees, and when the trees are properly thinned to admit air and light, the whole surface soon gets clothed with a close, rich, green sward of the finer natural grasses, such as has already been named, and which we need not repeat here.

The trees most suitable to be left as standards are such as are clothed with branches for a distance of at least one-half of the height of the tree. Trees that have been drawn up by confinement into long bare poles with a tuft of green branches at the top, are unsuitable for such a purpose, as they are almost sure to be upset by the wind when exposed, and such as are not upset get bark-bound, contract disease, and make no farther progress in the formation of timber.

On the estate of Churchill, county Armagh, Ireland, where the writer conducted estate improvements for a period of eighteen years, there are some fine old standard larches clothed with branches for a distance of two-thirds the height of the trees, and as they are in perfect health they produce large quantities of fine cones, which contain good plump seeds, free of disease, and are invaluable for propagating the species. In Ireland such a thing as the larch disease is unknown, at least in so far as the writer's experience and observation extends, which covers a period of some twenty years, and has been principally confined to the province of Ulster and Leinster.

The soils which the writer has found to be most conducive to the healthy development of these trees as standards, as well as the encouragement of a healthy undergrowth of permanent pasture, are as follows :—

(1) Light sandy loam.
(2) Gravelly loam.
(3) Clay loam.

As the word loam conveys but a loose or vague meaning, and might lead to error, we may briefly state that the word is meant here to represent such soils as contain from 5 to 10 per cent. of organic matter.

Soils containing from 10 to 20 per cent. of organic matter, commonly called vegetable mould, produce fine larch, Silver fir, and spruce fir when thoroughly drained, and any or all of these trees may be left as standards according to taste,

with the most happy results both as regards utility and scenic effect.

No. 4 consists of flat peaty soil, containing upwards of 20 per cent. of organic matter, and liable to be flooded occasionally during winter. This class of soil is best adapted for the healthy development of the different species of poplar, sallow, and alder, to be left as standards; and the following grasses and herbage thrive best as undergrowth:—

(1) Rough-stalked meadow grass (*Poa trivialis*) is a strong hardy grass, and quite at home under the shade of trees and damp situations. It produces young shoots from the base of the culms, which root themselves into the soil at the joints; and as these keep green the greater part of winter, it affords feeding for stock at a time when most pastures are bare. It is likewise a capital meadow grass, makes good hay, and gives a large return.

(2) Fiorin grass (*Agrostis stolonifera*) is another strong useful grass with a creeping root, the stolons of which root themselves into the ground, and produce young plants. It may be propagated either by cuttings or from seeds. It is a good useful grass, and gives a heavy crop on boggy ground and damp places that cannot be easily drained.

(3) Floating sweet grass (*Poa fluitans*) is a soft succulent plant, whose natural home is in muddy pools, wet ground, and sides of ditches. It is likewise perfectly at home under the shade of trees. It is invaluable for furnishing cold wet places that cannot be easily drained, and is much relished by cattle in a green state, but of too soft a texture for hay.

(4) Meadow foxtail grass (*Alopecurus pratensis*), (*A. fulvus*), (*A. geniculatus*), are all valuable grasses for permanent pasture, being early, succulent, and much relished by sheep and cattle; and when eaten down in spring they renew their foliage with great rapidity, which enhances their value very much. They are quite at home on damp boggy soil under the shade of trees, when not too crowded.

(5) Meadow catstail grass (*Phleum pratense*) is a well-known useful grass, indigenous to America. It thrives on a great variety of soils, but is best suited to damp moory soils rich in organic matter, as well as stiff tenacious clay, on all of which it gives a good return, and is relished very much by cattle either as hay or pasture.

(6) Purple melica-grass (*Melica cærulea*) inhabits damp spongy ground, and is valuable on acount of its hardiness, and for filling up gaps where some of the finer grasses refuse to grow.

(7) Vernal grass (*Anthoxanthum odoratum*) is an early productive grass; it grows on during summer and up to a late period in autumn.

(8) Crowfoot (*Ranunculus acris, R. ficaria, R. bulbosus,* and *R. repens*), are all highly useful forage plants; they inhabit damp shady places; they are not adapted for hay, but make excellent pasture for cattle and sheep; and cows fed upon pasture containing a mixture of these plants produce butter of a remarkable rich nutritious quality, hence one of the names applied to the plants—butter-cups.

(9) Meadow sweet (*Spiræa Ulmaria*) is another useful plant; it inhabits flat, damp meadow ground, and is invaluable on soft boggy places liable to be flooded during winter, where some of the finer grasses perish. It is perfectly at home under the shade of trees, makes excellent hay when mixed with any of the natural grasses, but should always be cut when in full flower, as the stem is apt to get hard and woody if allowed to ripen. The green leaves and after grass are much relished by stock of every kind.

The above list includes the grasses and herbage really useful on this class of soil; of course, there are a great many worthless plants—such as rushes, soft-grass, &c., mere weeds, and which we need not describe.

No. 5.—Stiff argillaceous or clayey soils are most suitable for the healthy development of the oak as standards, and in cutting down plantations it is by far the best tree to be left as such on this class of soil; and when allowed plenty of room it becomes a grand tree in every sense of the word, and even attains large dimensions on stiff plastic clay inimical to the growth of most other trees.

In the mountainous part of county Wicklow, Ireland, as well as the vale of Avoca, and Glennelly, in the same county, the oak occupies the same place as the Scotch fir in the Highlands of Scotland, being the natural wood of the country.

The soil consists principally of inorganic matter, clay, and gravel, resting upon clay slate rock; and the quality of timber produced here may be equalled, but certainly cannot be surpassed.

As an illustration of the influence which certain classes of soil has upon trees and plants, I may mention that the poplar here never attains the size of useful timber, even although planted upon soil of considerable depth. At Glen-Art Castle, the beautiful seat of the Earl of Carysfort, the writer stubbed out a number of these trees that had failed to establish themselves.

The following are the principal and most useful grasses and herbage plants found to inhabit the oak plantations in this locality :—

1. Catstail grass, ...	*Phleum pratense.*
2. Foxtail grass, ...	*Alopecurus pratensis.*
3. Bent grass, ...	*Agrostis setacea.*

4.	Bent grass,	*Agrostis vulgaris.*
5.	Hair grass,	*Aira crestata.*
6.	Melic grass,	*Melica nutans.*
7.	Meadow grass,	*Poa compressa.*
8.	„	„ *frivialis.*
9.	„	„ *pratensis.*
10.	„	„ *nemorilis.*
11.	Fescue grass,	*Festuca ovina.*
12.	„	„ *duriuscula.*
13.	„	„ *gigantea.*
14.	„	„ *calamaria.*
15.	„	„ *pratensis.*
16.	Dogstail grass,	*Cynosurus cristatus.*
17.	Oat grass,	*Avena flavescens.*
18.	Lime grass,	*Elymus europæus.*
19.	Cocksfoot grass,	*Dactylis glomerata.*
20.	Vernal grass,	*Anthoxanthum odoratum.*
21.	White clover,	*Trifolium repens.*
22.	Birdsfoot trefoil,	*Lotus corniculatus.*
23.	„	„ *decumbens.*
24.	„	„ *major.*
25.	Cranebill,	*Geranium pyrenaicum.*
26.	„	„ *pratensis.*
27.	Crowfoot,	*Ranunculus repens.*
28.	„	„ *acris.*
29.	Ladies' mantle,	*Alchemilla vulgaris.*
30.	Rib grass,	*Plantago lanceolata.*
31.	Meadow sweet,	*Spiræa Filipendula.*
32.	Coltsfoot,	*Tussilago Farfara.*

Coltsfoot (32) inhabits stiff plastic marly clay banks and waste ground, and although it is not eaten in a green state by cattle, yet it is used pretty extensively by small farmers in Ireland for feeding pigs. It is prepared by being boiled and mixed with a little cheap Indian meal, seasoned with salt. When prepared in this way pigs relish it, and thrive as well as when fed upon cabbage. The writer has used it for pig-feeding and found it to be a wholesome, thrifty diet for store pigs.

Dogstail grass (16) is a hardy deep-rooting grass, which thrives on stiff clay soil, but is better adapted for meadow than pasture ; when used for the latter, if not kept closely down by stock, it throws up a hard woody stem, which is both dry and unnutritious, and is consequently discarded by sheep and cattle ; but when cut for hay, the root throws up a succession of sweet tender leaves which are very nutritious, and much relished by stock of all kinds.

Rib grass (30) inhabits stiff clay soils that have not been thoroughly drained, as well as soils that retain any considerable amount of moisture by means of capillary attraction. It is quite at home on such places among trees, and is a useful, hardy, forage plant, but not adapted for hay.

General Remarks.

Plantations of any extent generally contain a variety of soils, and in cutting down and thinning out, the experienced forester will always be guided in a great measure by the trees found to be thriving best on any particular soil and situation as to what species will answer best (all things considered) to be left as standards. When plantations have been thinned to admit light and the warm rays of the sun, the surface weeds gradually disappear, and are replaced by a useful mixture of natural grasses. It is, however, always after a top-dressing of wood ashes, lime, and earth mixed, or bone meal, that the quickest and most permanent improvement is effected.

We have already noticed the beneficial effects derived from a dressing of wood ashes, but we can record equally good results from a dressing of lime and earth mixed together and applied in the end of harvest. Plantations, where the surface of the ground is stocked with a quantity of rushes, the best plan for the permanent improvement of such is to cut the rushes close over by the surface in the dry season of the year, say August, and apply the dressing about the end of the month, or any time during harvest, and the rushes will soon disappear, and be replaced by a thick crop of white clover and natural grasses—in fact, the change produced is marvellous, and appears almost magical.

The writer has likewise used bone manure for the improvement of old pastures in woods and plantations, with the most happy results. By applying a dressing of bones in spring, the grasses and herbage are immediately roused from a torpid to an active state, and plants that were formerly growing in harmony together are at once roused to a state of hostile competition for more field and space, and gradually, inch by inch, the cryptogamic and other useless forage plants give way and disappear, thus leaving the useful grasses the undisputed masters of the situation.

But it may be said by some that it would never pay to top-dress wood pasturage; this, however, is not the writer's experience, as the following statement will illustrate:—

In a plantation, the property of the late Sir William Verner, county Armagh, Ireland, where the trees consisted principally of sallow, poplar, and alder, the writer had them considerably thinned out to admit air and light with the view of improving the pasture. The timber that was cut being removed, the branches and rubbish were then collected and burned, and the ashes spread over the surface as a top-dressing. A quantity of mixed rye and permanent grass seeds were then sown on the places where the rubbish had been burned up.

The yearly value or rent charged for this plantation grass was

15s. per acre, but after the improvement had been effected, the writer sold the hay crop at £3, 10s. per acre, and the after grass, which was depastured by the owner's cattle, was at least worth 5s. per acre more, so that the actual account stands thus:—

Cash received for one acre plantation hay, .		£3	10	0
Value of after grass, ...		0	5	0
		£3	15	0
Rent of one acre, . .	£0 15 0			
Paid for cutting and making hay,	0 15 0			
		1	10	0
Net profit after improvement,		£2	5	0

As the improvement is of a permanent nature, the expense of burning the rubbish, grass seeds, &c., is charged as such on the estate.

When no top-dressing or grass seeds are used, the natural grasses and other plants soon clothe the surface with a green sward, and some people are content to wait and allow nature time to make her own selection; but the practical experienced man steps in here, and says, I must assist nature; she is trying to do what she can for me, and I must try and do something for her, and he at once prepares the surface, and as experience and observation have taught him what species of grass inhabit the different classes of soils and situations among trees, he sows and acts accordingly; and by top-dressing with bones, lime, and earth mixed, or ashes, he knows what the results will be as clearly as a first-class physician can tell what to prescribe for his patient. In all the writer's experience, which covers a period of some thirty years, he has never known a single case where cattle paid by being starved; and if we can add one half more value to our pastures and meadows to administer to their wants, the benefit to both landlord and tenant would be immense.

Land is perfectly honest, and whatever is put into it in the shape of manure, it will always give a satisfactory return in the shape of crop.

The most valuable grasses for permanent pasture among trees and elevated districts are undoubtedly the different species of fescue. They all thrive in a great variety of soils and situations, and form by far the largest proportion of the best sheep pastures in Scotland, and the mountainous districts of Wales, Anglesea, and the mountain districts clad with natural oak in county Wicklow, Ireland, all are stocked to a great extent with this grass; and it is a remarkable fact that all the above named places are celebrated, and justly so, for the sweet, fine quality of the mutton they produce.

LOUPING-ILL AND BRAXY.

Report by Committee.

As far as your Committee was able to ascertain, there was very little louping-ill or trembling during the past season. With a view to clearing up an important point raised by the report of last year, viz., that eradicating rank and coarse vegetation also got rid of the disease, and to meet the objection raised by many, that some of the "roughest" hills were most exempt from the disease, Mr Brotherston made a careful examination, in July, of Dalgleish, at the head of Ettrick, a very rough but healthy farm, and Craikhope and Howpasley, at the head of Borthwick, also rough, but very liable to disease, and the following is his report:—

"I found that, though the pastures at Dalgleish were 'rough,' and also composed of the same species of plants as in the diseased places, they were in very different proportions. On Dalgleish the Juncaceæ (rushes) and Cyperaceæ (sedges) predominate; *e.g.*, Luzula (woodrush) Juncus, Scirpus, and Eriophorum (cotton sedge). There was *very little* land that was any way likely to be liable to louping-ill, and that only on parts of some of the steeper southern slopes.

"From Dalgleish I crossed over by Moodlaw Loch to Craikhope and Howpasley, where I found the pastures very different, the Gramineæ (grasses) greatly predominating on the parts liable to louping-ill. So that, in point of fact, both districts may be said to be 'rough,' but the two are widely different, as the predominating plants on the one are *not* subject to be ergotised, while those on the other are so. Though this may not properly be called confirmatory evidence, that roughness of the pasture is a cause of the disease, still I consider it very good negative evidence to that effect."

Professor Williams also visited parts of the Moffat district, in which it had been stated that louping-ill existed without ticks being also present, and found that in general there were plenty, though they were this year there, as elsewhere, very scarce.

He further considers he has been successful in cultivating the organism from ticks which had never been on sheep.

He has also observed that Zündel, V.S., Strasbourg, describes a disease in lambs, in which an organism is found very similar to that of louping-ill, and which he says resembles the microscopic plant *Pleospora herbarum*.

Mr Thomas D. Gibson Carmichael, younger of Castle-craig, has taken up the study of the Ixodes (ticks), and his preliminary notes are herewith appended.

Notes on Ixodes (Ticks), *by Thomas D. Gibson Carmichael, younger, of Castle-craig.*

I have endeavoured to collect specimens of Ixodes from as many localities as possible, both in England and Scotland, during this year. The first specimens which I obtained were found among the roots of grasses in Peeblesshire, about the middle of March, and I have had specimens from time to time up to the first week in November. I have had difficulty in obtaining them from the sheep, as though many shepherds have promised to get them for me, they have almost always sent me the common insect parasite of the sheep. And though I have myself examined a considerable number of sheep, I have very seldom found anything but the insect. There is no difficulty in distinguishing the two, as while the insect has only 6 legs, the true tick has always 8. I have found Ixodes in considerable numbers on the bodies of rabbits and hares, and in one case on a roe deer; as that one case was the only roe I have examined, I have no doubt but that Ixodes regularly infests that animal. All species seem to pass the winter months of the year in a semi-torpid state amongst the roots of grasses; except in such situations, I have found none after the beginning of October, in the south of Scotland at least. They seem to be capable of living for a considerable time without nourishment. I received eleven specimens of what seems to be *Ixodes trabeatus* (Audonin), from Perthshire, in the first week of June. I have since kept them in a tin box containing a piece of sponge continually damped. Eight of these specimens are still alive (January 14, 1884). They lie at the bottom of the box among some broken pieces of grass, seem not to change their position, but move their legs about if touched, and if placed on their backs regain their natural position very quickly. They soon die, however, if the atmosphere in which they live is not kept damp. Excess of moisture seems to have but little effect on them. I have kept specimens floating in water from two to thirteen days, which when taken out of the water showed no signs of weakness. Like some centipedes, and many other arthropod animals, they can be frozen quite hard without losing their vital powers. I have found the genus widely distributed; and though sometimes I have searched a district without finding a specimen, I think this is to be attributed not to the absence, but to the insufficiency of my search. The males are not so easily found as the females. I have never seen a male which had been obtained from an animal, nor have I seen any female so obtained which was not adult. I have not been able, as yet, to make any experiments as to whether these creatures are really hurtful to the animal to which they are attached, but should louping-ill prove common

next spring, I hope to make a series of experiments on the subject. An illness, somewhat similar to louping-ill, seems to affect the lambs in the south-east of Italy. I have received Ixodes from the neighbourhood of Taranto, but no one in that part seems to connect the illness and the ticks together. I hope to be there in March next, when I shall endeavour to find whether there is any such connection. In determining the species of Ixodes, I have found some difficulty. Until I have examined the type specimens in continental museums, I find that I do not like to pronounce with certainty what is the species of any individual I may obtain. In the following notes I have followed the nomenclature used in Mr Andrew Murray's handbook of economic entomology.

1. *Ixodes erinaceus*, Audonin.—I have had specimens from every county in Scotland, except Orkney and Shetland, Caithness, Cromarty, Elgin, Banff, Kincardine, and Linlithgow. In none of these counties excepted have I been able to look or to get any one else to look for ticks. I have also had specimens from all the principal river basins in England. I have found it up to an altitude of 11,000 feet in Peeblesshire. I have generally found it by sweeping among rough grass. I have not found it either on sheep or cattle, though Murray says it is found on the latter. It is common on dogs, in August on rabbits throughout Scotland, and also seemingly on rats.

2. *Ixodes fodicus*, Meguin.—I have had three or four specimens from Devonshire of an Ixodes which seem to be this species. Murray gives a curious account of this creature attacking a mare. My specimens were found on ferns.

3. *Ixodes marginatus*, Leach.—This seems to be the commonest species throughout the south of Scotland, and seems to be the species which may be connected with louping-ill. I have specimens obtained from sheep early in the summer from Peeblesshire, Lanarkshire, and Wiltshire. I have none from any place north of the Forth, but fancy from what I hear that it occurs there. All through the late summer and early autumn it is common on bracken in the upper part of the Tweed watershed. I have several times induced the females to bite my hand, but the bite never was followed by any evil consequences, is not so painful as that of the ordinary cleg. I found it on rabbits and hares early in the year. I made experiments both on mutton and chicken broth with chopped-up specimens of this Ixodes, but found no results which could lead me to suppose that it is poisonous.

4. *Ixodes sp.?*—I have found, in Peeblesshire, Lanarkshire, and Wigtownshire, a species resembling the last, but of a bright red colour. I do not know whether it attacks sheep. I have generally found it on bracken, but in one case on a hare. Both

this and the last named species I have found at an altitude of more than 15,000 feet.

5. *Ixodes ricinus*, Koch.—There seems to be great confusion between this species and *I. erinaceus*. I have it from numerous localities in the south and middle of England, but always from herbage.

6. *Ixodes trabeatus*, Audouin.—A small Ixodes, with the anterior part of the body a deep black and the posterior part red; it is common in Perthshire, Argyllshire, and Ross-shire, and probably in many other counties. I found it plentiful among heather, in the neighbourhood of Oban and of Loch Maree, in September. It is the species to whose powers of fasting I have referred above. I took it plentifully off sheep in Portree market, about the middle of September, also with another (a small black species) off a sheep in a boat from the island of Raasay. (This is the species which I have found on a roe.)

7. *Ixodes sp.?*—The small black species referred to above.

8. *Ixodes sp.?*—Another species somewhat similar to No. 6, but brighter in colour, is common in the New Forest; probably these two species are identical, as also perhaps

9. *Ixodes sp.?*—A paler variety, three specimens of which I obtained from a sheep which had been brought from Iceland.

In addition to these, I have several species from Italy, which I have not been able to determine.

It seems to me that Ixodes is naturally a vegetable feeder, but that the adult females, possibly always, attach themselves for a time to animals. If they really poison the blood of the animals to which they are attached, it can only be, I think, by conveying poison indirectly from plants on which they have been already feeding.

Note on Braxy by Professor Williams.

I have had several opportunities of seeing "braxy" during this season, and so far as I can make out, it is nothing more than an acute form of indigestion, with inflammation of the bowels and flatulence, arising from eating food in a more or less fusted and decomposing condition; but before giving the Society a final report, I should like the grasses on "braxy-land" examined in November or December, when braxy mostly prevails, by a botanist, who might be able to determine if anything deleterious —such as some seed—is on or mixed with the grasses at that period of the year.

EXPERIMENTS ON TURNIPS.

By David Wilson, Jun., M.A., F.C.S., Carbeth, Killearn, Stirlingshire.

During the last two seasons experimental plots have been set apart on the turnip and oat breaks here. The experiments on turnips were arranged with the following objects in view:—

I. To make a practical analysis of the soil; that is, to find out whether it is most in need of nitrogen, phosphoric acid, or potash, or if it will repay the application of all of them.

II. To compare the effects of dissolved and finely ground undissolved phosphates. The varying results obtained by different experimenters seem to make this a question requiring to be determined locally. The basis of comparison adopted is that of equal money value.

III. To compare the yield with artificial manures only to the yield with dung and a less quantity of artificials. This being one step towards finding out whether in certain circumstances it would be more profitable to save the dung from the turnip crop and apply it to grass, as in this case there would probably be less nitrogen lost to the farm in drainage water.

IV. To test the influence of manures on the composition and keeping qualities of turnips. This part of the investigation was not attempted the first season.

The repetition of these experiments for some seasons on the turnip break of the year should give information of a practical kind from a considerable variety of soil.

The field upon which the experimental plots were placed in 1882 was a heavy loam resting upon boulder clay. It had grown oats in the previous season manured with 3 cwt. Peruvian guano (6½ per cent. ammonia, 37 per cent. phosphates), and the stubble in the beginning of December had received a dressing of 5 tons lime. Previous to the oat crop the field had lain long in grass, and was in a very poor state. Drains had been put in the grass 3 feet deep and 15 feet apart.

A piece of land, 252 feet by 242 feet, which looked uniform, was staked off for the plots. The accompanying plan (Table I.) shows the arrangement of the plots, and indicates the manures applied. Each of the 28 plots is formed of eight drills of 27 inches wide and 121 feet long, and is thus $\frac{1}{20}$th of an acre. The weights of bulbs obtained from each plot in cwts. per acre is inserted at the bottom for ease of reference. The plots were manured in the drill, and sown with 4 lbs. per acre Drummond's Aberdeen yellow turnip on the 15th of June. Table II. shows the rate of manure per acre on each plot, that is, $\frac{1}{20}$th of the weight indicated was applied to each plot. The plants brairded

well, and were singled on the 18th of July. The plants on the plots which had received dung were fairly uniform, those receiving dung only being slightly behind the others. The plants on the undunged plots that got superphosphate were on the average as good as those on the dunged plots. Those receiving ground mineral phosphate were somewhat poorer, while the plants on the plots which got no phosphatic manure were much the smallest. All the turnips on the field were checked in their growth, and the ultimate crop decreased by the large rainfall during the last two weeks of July. In the experimental ground some plots proved to be more clayey than others, and owing to this, along with the

TABLE I.

South.—252 *Feet.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
	All dung.							No dung.					
Nothing but dung.	Superphos.					Grd. mineral and superph., potash, and nitrogen.	Grd. mineral and superph. and nitrogen.	Superphosphate.				Ground mineral.	Nothing.
		Potash.							Potash.				
			Nitrogen.							Nitrogen.			
280	319	312	399	370	304	292	217	194	251	338	309	207	136

15	16	17	18	19	20	21	22	23	24	25	26	27	28
	All dung except 15.							No dung except 28.					
Nothing.	Ground mineral phosphate.			Superphosph.		Grd. mineral and superph., and nitrogen.	Grd. mineral and superph., potash, and nitrogen.	Grd. mineral phosphate.					Nothing but dung.
		Potash.							Potash.				
			Nitrogen.							Nitrogen.			
174	347	312	335	318	361	405	308	234	253	287	164	138	414

presence or absence in a plot of drains and previous furrows, the manures up to the end of August did not show very consistent results. From that time till late in the season the turnips grew well. All the bulbs, which were lifted and weighed on the 20th and 21st of December, were entirely free of disease. Table III. shows the weight of turnips obtained from each plot, calculated to cwts. and tenths of a cwt. per acre. Special reference may be made to four plots. No. 28 got dung only, and gave a better

TABLE II.

No. of Plot.	Dung.	Super-phosphate.		Ground Coprolites.		Nitrate of Soda.		Potash Salts.	
		Weight Applied.	Containing Tricalcic Phosphate made Soluble.	Weight Applied.	Containing Tricalcic Phosphate.	Weight Applied.	Containing Nitrogen = Ammonia.	Weight Applied.	Containing Potash.
	tons.	cwt.	lbs.	cwt.	lbs.	cwt.	lbs.	cwt.	lbs.
1	13	...	...	...	...	...	...	...	...
2	13	5	158	...	...	...	...	...	...
3	13	5	158	...	...	...	...	$\frac{3}{4}$	25½
4	13	5	158	...	...	$\frac{3}{4}$	16½	$\frac{3}{4}$	25½
5	13	...	...	...	...	$\frac{3}{4}$	16½	$\frac{3}{4}$	25½
6	13	...	...	...	...	$\frac{3}{4}$	16½	...	...
7	13	280 lbs.	79	210 lbs.	129	$\frac{3}{4}$	16½	$\frac{3}{4}$	25½
8	...	4	126	3	206	1½	33	...	...
9	...	8	253	...	...	...	...	...	...
10	...	8	253	...	...	...	...	1½	51
11	...	8	253	...	...	1½	33	1½	51
12	...	8	253	...	...	1½	33	...	...
13	...	...	...	6	412	1½	33	...	...
14	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...
16	13	...	...	3¾	257	...	...	...	...
17	13	...	...	3¾	257	...	...	$\frac{3}{4}$	25½
18	13	...	...	3¾	257	$\frac{3}{4}$	16½	$\frac{3}{4}$	25½
19	13	...	...	3¾	257	$\frac{3}{4}$	16½	...	...
20	13	5	158	...	...	$\frac{3}{4}$	16½	...	...
21	13	280 lbs.	79	210 lbs.	129	$\frac{3}{4}$	16½	...	...
22	...	4	126	3	206	1½	33	1½	51
23	...	...	...	6	412	...	...	...	...
24	...	...	...	6	412	...	...	1½	51
25	...	...	...	6	412	1½	33	1½	51
26	...	...	...	...	...	1½	33	1½	51
27	...	...	...	...	...	1½	33	...	...
28	13	...	...	...	...	...	...	...	...

yield than any of the other plots. It was easy to dung the other plots very equally, as they all lay adjacent, but 28 being detached from the other dunged plots had a separate cart taken to it, and thus probably received rather more than its share. It was also a very dry and favourable piece of ground. Plots 7, 8, and 9 were, on the other hand, the wettest part of the land. These plots might be discarded in considering the results, but, as in experiments with many comparatively small plots, reliance must be placed principally in averages, it has been considered better not to do so, but to include these plots in the tables of averages.

The field on which the plots were put in 1883 had borne oat crops in both 1881 and 1882. Previously it had been long in grass, and was in a poor state, bringing 18s. per acre at public roup. The first oat crop was manured with 3 cwt. Peruvian guano ($6\frac{1}{2}$ per cent. ammonia, 37 per cent. phosphates), and drains were put in the stubble 3 feet deep and 15 feet apart. The second oat crop got 2 cwt. superphosphate (28 per cent.) and 1 cwt. good dissolved bones with the seed, and a top-dressing of 1 cwt. nitrate soda after brairding ; 5 tons lime were laid on this stubble in the middle of January. The part of the field chosen for experiment seemed very uniform, and though of the same nature was scarcely so clayey as the experimented ground of the previous season. The size and number of the plots were the same, but a change was made in their relative position, so as in the comparison of dissolved with undissolved phosphates to neutralise as much as possible any variation in the soil. Table IV. shows the plan for 1883, with the weight of bulbs at the foot of each plot. The superphosphate is not principally on the south side, and ground mineral on the north side as in 1882, but half on each. The rate per acre at which each plot was manured is shown in Table V. Less tricalcic phosphate in the form of ground coprolites was obtained for

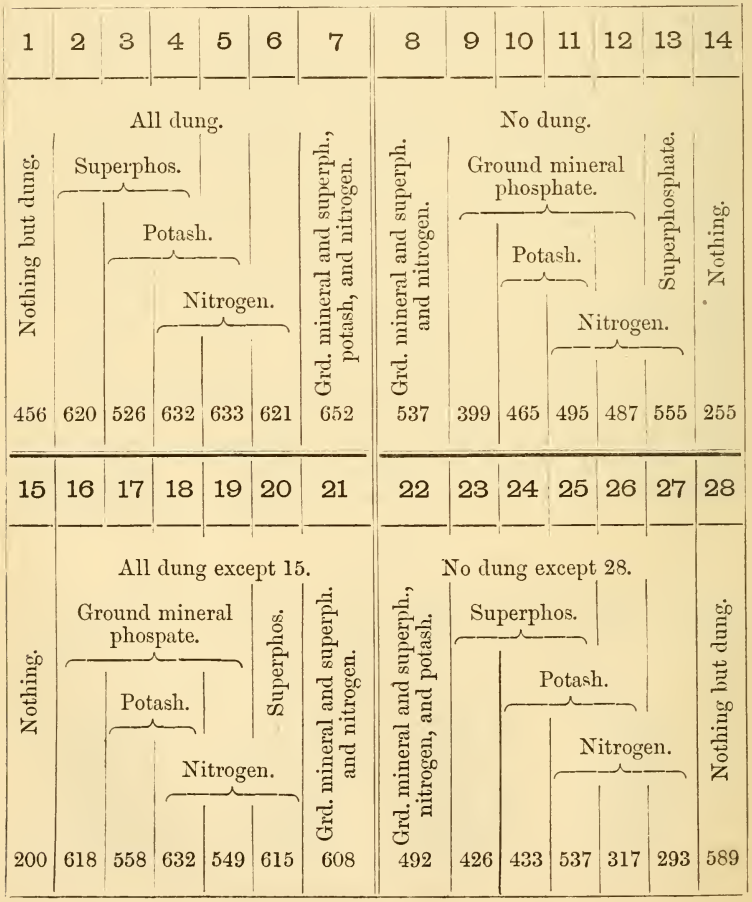
Table III.

Plot.	Bulbs. per Acre.	Plot.	Bulbs. per Acre.	Plot.	Bulbs. per Acre.	Plot.	Bulbs. per Acre.
	cwt.		cwt.		cwt.		cwt.
1	280·3	8	216·8	15	173·6	22	307·7
2	319·1	9	193·9	16	347·3	23	234·3
3	311·6	10	250·9	17	312·0	24	253·2
4	399·0	11	338·4	18	335·2	25	287·3
5	370·0	12	309·1	19	317·9	26	164·4
6	304·1	13	207·1	20	361·2	27	138·4
7	292·1	14	135·9	21	405·5	28	414·1

the same money as the superphosphate than in the previous season. This is due to the dissolved phosphates costing rather less, and the undissolved rather more. The ground coprolites used in 1883 was probably the only manure used which might have been bought cheaper, perhaps for 10 per cent. less. It was not used for the general crop, and a small quantity only required, and therefore estimates could not be taken for it.

The plots were sown with Drummond's Aberdeen yellow turnip on 26th May, and were singled on 29th and 30th June. At that time the plots had much the same relative appearance as in the previous year. The turnips grew on without a check, and proved a heavy crop—nearly double of that of the previous year.

TABLE IV.



When lifted and weighed on 26th and 27th November they were free from disease. The soil also seemed to be very uniform, and nothing was observed to interfere with the effects of the manures. A pit was formed on each plot of all the turnips that grew upon it. The samples for analysis were selected from these pits. They were then properly protected, and when lifted in spring the percentage of sound bulbs in each plot can be noted.

The same difficulty was experienced in applying dung to No.

TABLE V.

No. of Plot.	Dung.	Super-phosphate.		Ground Coprolites.		Nitrate of Soda.		Potash Salts.	
		Weight Applied.	Containing Tri-calcic Phosphate made Soluble.	Weight Applied.	Containing Tricalcic Phosphate.	Weight Applied.	Containing Nitrogen = Ammonia.	Weight Applied.	Containing Potash.
	tons.	cwt.	lbs.	lbs.	lbs.	cwt.	lbs.	cwt.	lbs.
1	13	...	...	...	...	...	...	...	...
2	13	5	158	...	...	...	...	...	...
3	13	5	158	...	...	...	...	$\frac{3}{4}$	$23\frac{1}{2}$
4	13	5	158	...	...	$\frac{3}{4}$	$16\frac{1}{2}$	$\frac{3}{4}$	$23\frac{1}{2}$
5	13	...	...	...	...	$\frac{3}{4}$	$16\frac{1}{2}$	$\frac{3}{4}$	$23\frac{1}{2}$
6	13	...	...	...	...	$\frac{3}{4}$	$16\frac{1}{2}$	...	...
7	13	$3\frac{1}{3}$	105	165	76	$\frac{3}{4}$	$16\frac{1}{2}$	$\frac{3}{4}$	$23\frac{1}{2}$
8	...	$5\frac{1}{3}$	169	265	123	$1\frac{1}{2}$	33	...	...
9	...	...	...	794	367	...	...	...	...
10	...	...	...	794	367	...	...	$1\frac{1}{2}$	47
11	...	...	...	794	367	$1\frac{1}{2}$	33	$1\frac{1}{2}$	47
12	...	...	...	794	367	$1\frac{1}{2}$	33	...	...
13	...	8	253	...	...	$1\frac{1}{2}$	33	...	...
14	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...
16	13	...	...	496	229	...	...	...	...
17	13	...	...	496	229	...	...	$\frac{3}{4}$	$23\frac{1}{2}$
18	13	...	...	496	229	$\frac{3}{4}$	$16\frac{1}{2}$	$\frac{3}{4}$	$23\frac{1}{2}$
19	13	...	...	496	229	$\frac{3}{4}$	$16\frac{1}{2}$	...	...
20	13	5	158	...	...	$\frac{3}{4}$	$16\frac{1}{2}$	...	...
21	13	$3\frac{1}{3}$	105	165	76	$\frac{3}{4}$	$16\frac{1}{2}$	...	...
22	...	$5\frac{1}{3}$	169	265	123	$1\frac{1}{2}$	33	$1\frac{1}{2}$	47
23	...	8	253	...	...	...	...	...	...
24	...	8	253	...	...	...	...	$1\frac{1}{2}$	47
25	...	8	253	...	...	$1\frac{1}{2}$	33	$1\frac{1}{2}$	47
26	...	...	...	...	...	$1\frac{1}{2}$	33	$1\frac{1}{2}$	47
27	...	...	...	...	...	$1\frac{1}{2}$	33	...	...
28	13	...	...	...	...	...	...	...	...

28, and in the fear of giving it too little it probably got rather much. In future experiments it is proposed to weigh out the dung for each plot. Table VI. gives the weight of bulbs obtained from each plot expressed as cwts. per acre.

In both seasons the turnips were thoroughly ripe on all the plots, and therefore little information could have been obtained from weighing the leaves.

The results for both seasons will be best discussed in relation to the objects mentioned at the beginning of this paper. These were—

I. *To make a practical Analysis of the Soil.*—It is evident that the wants of the soil should be more distinctly indicated

Table VI.

Plot.	Bulbs. Per Acre.	Plot.	Bulbs. Per Acre.	Plot.	Bulbs. Per Acre.	Plot.	Bulbs. Per Acre.
	cwt.		cwt.		cwt.		cwt.
1	455·7	8	537·2	15	199·7	22	492·5
2	620·4	9	398·8	16	617·9	23	426·1
3	526·4	10	465·0	17	558·2	24	433·0
4	632·3	11	495·0	18	632·3	25	537·0
5	632·9	12	486·8	19	548·6	26	317·5
6	621·4	13	555·0	20	614·7	27	293·0
7	652·0	14	254·8	21	608·2	28	589·3

Table VII.

Nitrogen without Dung.

1882.		1883.	
Plots with Nitrate of Soda.	Plots without Nitrate of Soda.	Plots with Nitrate of Soda.	Plots without Nitrate of Soda.
11 = 338·4	10 = 250·9	11 = 495·0	10 = 465·0
25 = 287·3	24 = 253·2	25 = 537·0	24 = 433·0
12 = 309·1	9 = 193·9	12 = 486·8	9 = 398·8
13 = 207·1	23 = 234·3	13 = 555·0	23 = 426·1
	Mean of		Mean of
27 = 138·4	14 & 15 = 154·7	27 = 293·0	14 & 15 = 227·2
Mean = 256·1	Mean = 217·4	Mean = 473·3	Mean = 390·0
Increase due to 1½ cwt. Nitrate of soda, At a cost of 21/4½	cwt. = 38·7	Increase due to 1½ cwt. Nitrate of soda, At a cost of 18/6	cwt. = 83·3

by the results of the undunged plots, for in the other plots the dung may supply all that is required of one or more constituents. The results from the dunged and undunged plots are therefore kept separate. The application of 5 tons lime to the stubble in the previous winter rendered the precautionary addition of lime and magnesia to the manure unnecessary.

(A) *Nitrogen.*—Table VII. shows how far the land experimented on requires nitrogen to grow turnips. In this table all the plots put against each other for comparison have the same manures except that in the one case they received nitrate of soda and in the other none. Thus plot 10 received superphosphate and potash salts, while plot 11, compared with it, received exactly the same manure, with the addition of $1\frac{1}{2}$ cwt. nitrate of soda per acre. It will be seen from an examination of Tables II. and V. that this is also true for each pair of plots compared both in 1882 and 1883. As it is evident that nitrogen without the addition of phosphates in some form cannot have its full effect upon turnips, the trial 27 against the mean of 14 and 15 might be omitted in the table, and in this case the average increase by using nitrate of soda would be increased, especially in 1882. The increase in both years is approximately 20 per cent., and shows that both fields are benefited by nitrogen; but while its use for turnips might pay in a large crop like that of 1883, the increased growth taking advantage of a supply of

Table VIII.

Nitrogen with Dung.

1882.		1883.	
Plots with Nitrate of Soda.	Plots without Nitrate of Soda.	Plots with Nitrate of Soda.	Plots without Nitrate of Soda.
4 = 399·0	3 = 311·6	4 = 632·3	3 = 526·4
18 = 335·2	17 = 312·0	18 = 632·3	17 = 558·2
20 = 361·2	2 = 319·1	20 = 614·7	2 = 620·4
19 = 317·9	16 = 347·3	19 = 548·6	16 = 617·9
	Mean of		Mean of
6 = 304·1	1 & 28 = 347·2	6 = 621·4	1 & 28 = 522·5
Mean = 343·5	Mean = 327·4	Mean = 609·9	Mean = 569·1
Increase due to $\frac{3}{4}$ cwt. Nitrate of soda, At a cost of 10/8½ = 16·1 cwt.		Increase due to $\frac{3}{4}$ cwt. Nitrate of soda, At a cost of 9/3 = 40·8 cwt.	

soluble nitrogen, the additional roots grown by its use in a small crop such as that of 1882 are dear. This result is confirmed by Table VIII., which shows the result of ¾ cwt. of nitrate of soda with dung.

(B) *Potash.*—Table IX. is arranged on the same principle, to show whether the soil experimented on will repay the addition of potash. The plots put against each other differ only in the presence of 1½ cwt. potash salts, containing approximately 50 lbs. potash, in the manure given to the one and its absence in the manure given to the other. The application pays well on the experimental soil of 1882, and would probably have shown a greater increase with a more favourable season and heavier crop.

The ground experimented on in 1883, on the other hand, is practically not benefited by potash, and shows the necessity of determining the need of this manure before investing in it largely. Table X. shows that 16 loads of good dung supply enough potash for the growth of the turnip plant. The decrease in 1882 amounts on the average to 6 cwt. per acre; but in this case it is probably better to consider this as merely an experimental difference, that might have occurred in the averages of two lots of five plots similarly manured, and not as a depression due to the potash salts. It is not probable that the amount of mineral acids set free according to Meyer's hypothesis from ¾ cwt. of potash salts per acre could injure the crop in the presence of a large excess of lime in the surface soil,

TABLE IX.

Potash without Dung.

1882.		1883.	
Plots with Potash Salts.	Plots without Potash Salts.	Plots with Potash Salts.	Plots without Potash Salts.
10 = 250·9	9 = 193·9	10 = 465·0	9 = 398·8
24 = 253·2	23 = 234·3	24 = 433·0	23 = 426·1
11 = 338·4	12 = 309·1	11 = 495·0	12 = 486·8
25 = 287·3	13 = 207·1	25 = 537·0	13 = 550·0
26 = 164·4	27 = 138·4	26 = 317·5	27 = 293·0
22 = 307·7	8 = 216·8	22 = 492·5	8 = 537·2
Mean = 267·0	Mean = 216·6	Mean = 456·7	Mean = 449·5
Increase due to 1½ cwt. Potash salts, . = 50·4 cwt. At a cost of 8/7½		Increase due to 1½ cwt. Potash salts, . = 7·2 cwt. At a cost of 7/10½	

and this view is borne out by the result in 1883 on land which was less in need of potash.

(C) *Phosphoric Acid.*—In Table XI. plots are compared with superphosphate, with ground mineral, and with no phosphatic manure, but with the same manures in other respects. Eight cwt. of superphosphate nearly doubles the crop both seasons, and shows that on this soil phosphoric acid is the principal require-

TABLE X.

Potash with Dung.

1882.		1883.	
Plots with Potash Salts.	Plots without Potash Salts.	Plots with Potash Salts.	Plots without Potash Salts.
3 = 311·6	2 = 319·1	3 = 526·4	2 = 620·4
17 = 312·0	16 = 347·3	17 = 558·2	16 = 617·9
4 = 399·0	20 = 361·2	4 = 632·3	20 = 614·7
18 = 335·2	19 = 317·9	18 = 632·3	19 = 548·6
5 = 370·0	6 = 304·1	5 = 632·9	6 = 621·4
7 = 292·1	21 = 405·4	7 = 652·0	21 = 608·2
Mean = 336·6	Mean = 342·5	Mean = 605·7	Mean = 605·2
Decrease due to ¾ cwt. Potash salts, = 5·9 cwt. At a cost of 4/3¾		Increase due to ¾ cwt. Potash salts, = 0·5 cwt. At a cost of 3/11¼	

TABLE XI.

Phosphoric Acid without Dung.

1882.			1883.		
Plots with Super-phosphate.	Plots with no Phosphatic Manure.	Plots with ground Coprolites.	Plots with Super-phosphate.	Plots with no Phosphatic Manure.	Plots with ground Coprolites.
	Mean of			Mean of	
9 = 193·9	14 & 15 = 154·7	23 = 234·3	23 = 426·1	14 & 15 = 227·2	9 = 398·8
11 = 338·4	26 = 164·4	25 = 287·3	25 = 537·0	26 = 317·5	11 = 495·0
12 = 309·1	27 = 138·4	13 = 207·1	13 = 555·0	27 = 293·0	12 = 486·8
Mean = 280·5	Mean = 152·5	Mean = 242·0	Mean = 506·0	Mean = 279·2	Mean = 460·2
Increase due to 8 cwt. Super-phosphate, = 128·0 cwt. Increase due to 6 cwt. ground Coprolites, = 90·4 cwt. Each costing 30/			Increase due to 8 cwt. Super-phosphate, = 226·8 cwt. Increase due to 7 cwt. 10 lbs. ground Coprolites, = 181·0 cwt. Each costing 26/7		

ment for a turnip crop. On the plots with dung Table XII. shows that 5 cwt. superphosphate gave a comparatively small increase in both seasons; while in 1882, $3\frac{3}{4}$ cwt. ground coprolites actually decreased the yield slightly.

No doubt the decrease is due to the large yield on plot 28 in that season previously explained, but it may be inferred that the dung given was able to supply almost all the phosphoric acid required by the turnips during the growth of the bulb, and that

TABLE XII.

Phosphoric Acid with Dung.

1882.			1883.		
Plots with Superphosphate.	Plots with no Phosphatic Manure.	Plots with Ground Coprolites.	Plots with Superphosphate.	Plots with no Phosphatic Manure.	Plots with ground Coprolites.
	Mean of			Mean of	
2=319·1	1 & 28=347·2	16=347·3	2=620·4	1 & 28=522·5	16=617·9
4=399·0	5=370·0	18=335·2	4=632·3	5=632·9	18=632·3
20=361·2	6=304·1	19=317·9	20=614·7	6=621·4	19=548·6
Mean=359·7	Mean=340·4	Mean=333·5	Mean=622·5	Mean=592·3	Mean=599·6
Increase due to 5 cwt. Superphosphate, . . . cwt. 19·3			Increase due to 5 cwt. Superphosphate, . . . cwt. 30·2		
Decrease due to $3\frac{3}{4}$ cwt. ground Coprolites, . . . cwt. 6·9			Increase due to 4 cwt. 48 lbs. Coprolites, ... cwt. 7·3		
Each costing 18/9			Each costing 16/7½		

TABLE XIII.

Superphosphate against Ground Coprolites.

	1882.			1883.	
	Plots with Superphosphate.	Plots with Ground Coprolites.		Plots with Superphosphate.	Plots with Ground Coprolites.
No dung. Dunged.	2=319·1	16=347·3	No dung. Dunged.	2=620·4	16=617·9
	3=311·6	17=312·0		3=526·4	17=558·2
	4=399·0	18=335·2		4=632·3	18=632·3
	20=361·2	19=317·9		20=614·7	19=548·6
	9=193·9	23=234·3		23=426·1	9=398·8
	10=250·9	24=253·2		24=433·0	10=465·0
	11=338·4	25=287·3		25=537·0	11=495·0
	12=309·1	13=207·1		13=555·0	12=486·8
	Mean=310·4	Mean=286·8		Mean=543·1	Mean=525·3
	Excess in favour of Superphosphate, cwts. 23·6			Excess in favour of Superphosphate, cwts. 17·8	

the increase by addition of superphosphate is due to its assisting the plant with soluble phosphoric acid during its earlier stages of growth, and probably a much less quantity than 5 cwt. per acre would effect this purpose.

II. *Ground against Dissolved Phosphates.*—The second inquiry proposed was, whether it is more economical in this soil to apply phosphates in a finely ground state or dissolved by treatment with acid. Table XIII. shows the plots in which they are compared. Each plot on the left hand received superphosphate, while the one opposite it on the right got the same manure, except that the superphosphate was replaced by an equal money value of ground mineral phosphates. The basis of equal money value being subject to fluctuation, may be thought inferior to the one usually adopted, that of equal weights of phosphoric acid. The soluble phosphates, as has been often pointed out, become insoluble in the soil, but in a very much finer state of division than any mechanical grinding can effect. Indeed, 10 per cent. to 30 per cent. of the ground mineral phosphate is comparatively coarse powder. The effect therefore to the crop to which equal amounts of phosphoric acid are applied should be more or less in favour of dissolved phosphates. It is merely a question of amount, and experiment on the whole has borne this out. The practical question to solve for any soil is whether the larger amount of phosphoric acid, that can be purchased as the cheaper ground phosphate, will overcome the superiority in form of the superphosphate. It seems better to test this directly than by calculations which have given room for discussion. The superphosphate contains sulphate of lime which is not present in the ground mineral, and in other circumstances it would have been advisable to add this to the latter manure, as in some cases the superiority of superphosphate has been attributed to deficiency of sulphates in the soil. It was unnecessary, however, to do this in these experiments as the 5 tons of lime, of which analysis will be found at the end of this paper, supplied a sufficiency of sulphates.

The comparative trial stands thus—

	1882.					
	Without Dung.			With Dung.		
	Weight Applied, per Acre.	Tricalcic Phosphate, per Acre.	Cost, per Acre.	Weight Applied, per Acre.	Tricalcic Phosphate, per Acre.	Cost, per Acre.
	cwt.	lbs.		cwt.	lbs.	
Superphosphate, . .	8	250	30/	5	157	18/9
Ground coprolites, . .	6	412	30/	3¾	257	18/9

	1883.					
	Without Dung.			With Dung.		
	Weight Applied, per Acre.	Tricalcic Phosphate, per Acre.	Cost, per Acre.	Weight Applied, per Acre.	Tricalcic Phosphate, per Acre.	Cost, per Acre.
	cwt.	lbs.		cwt.	lbs.	
Superphosphate, . .	8	250	26/7	5	157	16/7½
	cwt. lbs.			cwt. lbs.		
Ground coprolites, . .	7 10	367	26/7	4 48	229	16/7½

Notwithstanding the much larger quantity of tricalcic phosphate applied as ground mineral, the dissolved phosphates produced on the average about 8 per cent. more turnips in 1882, and 3 per cent. more in 1883; and it makes little difference whether the plots receiving artificials alone are considered or the dunged plots included in the average. If plot 9 in 1882, previously mentioned, were excluded from the comparison, the average superiority of superphosphate in that season would be increased to about 10 per cent.

It has been mentioned that in 1883 the ground mineral was comparatively dearer than the superphosphate. The small additional quantity of tricalcic phosphate that might have been added to the ground mineral plots would probably have gone far to increase the average yield from them by 17 cwt., and so make them equal to the superphosphate plots. In any case, much dependence cannot be placed in a difference of 3 per cent. in field trials; and ground mineral may be said to have had ultimately as good an effect as an equal money value of superphosphate on the experimental ground of 1883. A long growing season and a large crop seem to favour the ground mineral phosphate, as in that case advantage is taken of the large amount of phosphates that can be supplied in that form. On this class of soil, however, under circumstances the most favourable for ground mineral, an equal money value of superphosphate has so far produced at least as heavy a crop, and unless it can be shown that future crops are better on the ground mineral plots there seems no reason to desert the dissolved in favour of the ground phosphates. It may also be adduced in favour of superphosphate that in *both* seasons the plants on the plots receiving the manure grew more rapidly at first, and were decidedly larger when singled than on the ground mineral plots, and had they been attacked by fly would probably have struggled more successfully against it.

Four plots—Nos. 7, 8, 21, and 22—were added to the experiment to decide whether a mixture of soluble and insoluble phosphates was better than either alone.

In 1882, as before mentioned, 7 and 8 were on the wettest part of the soil, and for that reason this trial is not satisfactory. It may be noticed that plot 22, with potash, nitrate of soda, and a mixture of ground and dissolved mineral, though it looked better in August, ultimately yielded 30 cwt. an acre less than plot 11, which received the same manure, with the exception of the phosphates being all in the dissolved state; but in the absence of confirmatory evidence, this result is not of much value. In 1883 the average yield from plots 7, 21, 22, and 8, with superphosphate and ground mineral mixed, is 572·5 cwt. per acre, while the average produce from the corresponding plots 4, 20, 23 and 13, with equal money value of superphosphate alone, is 584·7 cwt. The mixture, though better than ground mineral alone, gives no encouragement to use it in preference to superphosphate.

III. *Artificials alone against Dung with less Artificials.*—In Table XIV. only plots to which phosphoric acid has been added in some form are included, for no one would attempt to grow turnips on undunged land without giving phosphates. The dung was not analysed, but was of excellent quality. For both crops it was made during the preceding winter by twenty feeding cattle in stalls and six horses. The cattle got 60 lbs. of pulped turnips mixed with 15 lbs. hay and straw chaff, also 4 lbs. linseed cake and 2 lbs. light oats per diem, and the horses were liberally fed. The liquid as well as solid manure from both

Table XIV.

Dung with Artificials against no Dung but more Artificials.

1882.		1883.	
Plots with Dung and Artificials.	Plots with no Dung but more Artificials.	Plots with Dung and Artificials.	Plots with no Dung but more Artificials.
2 = 319·1	9 = 193·9	2 = 620·4	23 = 426·1
3 = 311·6	10 = 250·9	3 = 526·4	24 = 433·0
4 = 399·0	11 = 338·4	4 = 632·3	25 = 537·0
20 = 361·2	12 = 309·1	20 = 614·7	13 = 555·0
7 = 292·1	22 = 307·7	7 = 652·0	22 = 492·5
16 = 347·3	23 = 234·3	16 = 617·9	9 = 398·8
17 = 312·0	24 = 253·2	17 = 558·2	10 = 465·0
18 = 335·2	25 = 287·3	18 = 632·3	11 = 495·0
19 = 317·9	13 = 207·1	19 = 548·6	12 = 486·8
21 = 405·5	8 = 216·8	21 = 608·2	8 = 537·2
Mean = 340·0	Mean = 259·9	Mean = 601·1	Mean = 482·6

went into a covered dung pit, where it was turned and mixed, and kept entirely under cover till carted out to the drills. The manure for the experimental plots was taken from a homogeneous section across this dung pit. It is evident from these experiments that nitrogen can be applied to the turnip crop so that it will return a much greater quantity in increase for 100 lbs. applied than when given as a heavy dressing of dung. At the same time, as was to be expected from the growing period of turnips continuing later and their roots having a longer possession of the soil, more of the nitrogen from dung is taken advantage of by the turnip crop than by a cereal crop. In the case of barley, the Rothamstead experiments have shown that only 10·7 per cent. of the nitrogen in dung applied is recovered in increase. The relatively better effect of dung upon turnips may also be partly due to their being more dependent upon a supply of carbon in the soil than cereals. In wet seasons, such as 1882, the mechanical effect of the dung is also very beneficial to the turnip plant on this clayey land in keeping the soil open. As, however, a large quantity of the nitrogen in dung—at least three fourths, whether calculations be based on the composition or cost of the dung—is not exhausted by the turnip crop, and remains subject to loss in bare ground for several months, it would probably be more economical to apply the dung to grass whose roots have possession of the land all the year, and would reduce the loss of nitrates in drainage water to a minimum. The average results for some years of these experiments on turnips must be supplemented (1) by observations on the effect of the unexhausted manure on future crops, and (2) by experiments upon the effect for a succession of years of one application of dung to grass land in the quantity and quality of the produce, before a definite statement can be made as to the relative economy of these two methods of applying dung.

IV. *Influence of Manures on Composition of Turnips.*—As before mentioned, the turnips were not analysed in 1882. The turnips selected for analysis in 1883 were intended to be the average size of the bulbs on the plot. After thorough cleaning they were weighed in the laboratory, and were found to represent relatively the weight of the crops as nearly as could be expected. It was evident, however, from their weight and the distance between the bulbs, that all the samples were slightly above the average size. On this account the absolute amount of dry matter per acre on all the plots is more likely to be slightly under than over stated, there being generally more water in large than small bulbs. Slices representing the bulbs were dried till they could be finely powdered, and the powder weighed and preserved in air-tight bottles. The residual water was determined by passing dried air over the sample kept at

110° to 112° C. in an oil bath till it ceased to lose weight, and this determination was generally checked by repetition. In this part of the work I am much indebted to Dr Aitken, who very kindly gave me the benefit of his experience in the analysis of turnips. He also visited the experimental plots in the autumn of 1882, and helped to select a piece of ground for the experiments of 1883.

Nearly 400 bulbs were analysed, or about 2 per cent. of the weight of the crop. The resources of the laboratory did not allow of very many analyses proceeding at once, and after these were analysed the turnips in the pits were found to have grown so much in the mild winter that the analysis of fresh samples was not thought advisable. More bulbs than this would have to be analysed to get at the absolutely correct results for each plot, but the error of the mean results of any five plots should be small.

Table XV. gives the results of analysis. It has been pointed out by previous analysts that the percentage of ash decreases with the increase of dry matter. This has been found to be generally true in the bulbs analysed from these experimental plots, and although the relation of the numbers is not definite or regular, they to some extent mutually check each other. An examination of these results leads to the general conclusion that bulbs under 4 lbs. weight differed little in composition, and very few bulbs in the samples selected from the undunged plots exceeded this weight. Indeed, the variations in turnips under this weight are so small that they cannot be ascribed to the manures applied with much certainty. As the bulbs increase in size, the percentage of ash rises rapidly, and the dry matter decreases, but not to a great extent. An additional analysis was made of a lot of selected large bulbs, whose average weight was 7 lbs., and the results obtained were 8·0 per cent. dry matter, and in this 8·4 per cent. ash. Whatever has a tendency to produce large bulbs affects their composition in this way; but as the limits of dry matter found were 9·2 per cent. in small bulbs and 8 per cent. in very large yellow turnips, that is to say, one turnip of 7 lbs. contained more dry matter than two of 3 lbs., the deductions to be made from the heavier crops on account of additional water are not very great. The composition of these turnips may be examined more particularly as they are affected (1) by the presence of nitrate of soda, (2) by the dissolving of the phosphates, and (3) by dung. In doing so, it will not be necessary to repeat the tables already given. Thus in Table VII. (1883) if the amount of dry matter per cent. and per acre, and ash in dry matter per cent. from Table XV. be supplied opposite each plot, and the averages taken, it will be found that the mean results for five plots with nitrate of soda, are dry matter 8·9

per cent. and 42·2 cwt. per acre, and ash in dry matter 6·8 per cent.; while without nitrate of soda, the means of the corresponding five plots are, dry matter 9 per cent. 35·1 cwt. per acre, and ash 6·6 per cent. The percentage of dry matter in the bulbs is slightly higher, and the ash lower on the plots which got no nitrate of soda, but the difference is so small as not to be worth considering in estimating the value of the crop. When given along with dung, nitrate of soda increased the water in turnips to a slightly greater extent. The analytical numbers, if supplied in Table VIII. give as a mean with nitrate of soda 8·5 per cent. dry matter, and without nitrate of soda 8·7 per cent. This is confirmed by the increase of ash. When nitrate is used, the mean percentage in the dry matter is 7·8, and when it is not 7·5.

Table XV.

Dry Matter and Ash in Bulbs.

Plots.	Water, per cent.	Dry Matter.		Ash.	
		per cent.	cwt. per acre.	In dry Matter, per cent.	lbs. per acre.
1	91·1	8·9	40·6	7·4	336
2	91·3	8·7	54·0	7·1	429
3	91·1	8·9	46·8	7·9	414
4	91·6	8·4	53·1	7·9	470
5	91·1	8·9	56·3	7·4	467
6	91·4	8·6	53·4	8·1	484
7	91·3	8·7	56·7	7·7	489
8	91·0	9·0	48·3	6·7	363
9	91·3	8·7	34·7	6·9	268
10	91·0	9·0	41·9	6·6	309
11	91·3	8·7	43·1	7·2	347
12	91·1	8·9	43·3	6·5	315
13	91·1	8·9	49·4	6·5	360
14	91·1	8·9	22·7	6·6	168
15	90·9	9·1	18·2	6·5	132
16	91·6	8·4	51·9	7·4	430
17	91·1	8·9	49·7	7·5	417
18	91·2	8·8	55·6	7·6	473
19	91·5	8·5	46·7	7·5	392
20	91·6	8·4	51·7	7·7	446
21	91·9	8·1	49·2	7·5	413
22	91·3	8·7	42·8	6·9	331
23	90·9	9·1	38·8	6·3	274
24	90·8	9·2	39·8	6·5	290
25	90·8	9·2	49·4	6·8	376
26	91·3	8·7	27·6	7·6	235
27	91·2	8·8	25·8	7·0	202
28	91·1	8·9	52·4	7·8	458

The addition of ¾ cwt. nitrate of soda gives a mean increase of 2·3 cwt. dry matter, so that about one-third of the increase in weight of bulbs (40 cwt.) shown in Table VIII. is water, and the additional turnips grown by the use of the nitrate along with dung will cost about 7s. per ton.

The next point worthy of note is the comparative composition of turnips grown with dissolved and undissolved phosphates. Taking the dunged plots first, the mean dry matter in plots 2, 3, 4, and 20, which got superphosphate, is 8·6 per cent., and ash in dry matter 7·65 per cent., and the mean results of the corresponding plots which got ground coprolites are practically the same, namely, dry matter 8·65 per cent., and ash 7·5 per cent. On the undunged plots, on the other hand, superphosphate gives a rather better result than ground mineral. The mean of the dry matter in the superphosphate plots (23, 24, 25, 13) is 9·1 per cent., while in the corresponding coprolite plots (9, 10, 11, 12), it is 8·8 per cent., and the percentage of ash in the dry matter is higher in the latter—6·8—against 6·5 in the superphosphate plots. The phosphoric acid was determined in these ashes, and gave in the bulbs grown with superphosphate 11·51 per cent. of the ash, and in those grown with coprolites 10·03 per cent., so that, although the percentage of ash is higher with coprolites, more phosphoric acid was absorbed by the turnips when superphosphate was used. The mean dry matter per acre of the eight superphosphate plots given in Table XIII. is 47·9 cwt., while in the eight corresponding coprolite plots it is 45·9 cwt., showing a superiority of nearly 5 per cent. in favour of superphosphate; whereas there was only 3 per cent. of difference in the actual weights of the turnips on the plots. Making allowance for unavoidable errors in sampling, it may be fairly inferred that the bulbs grown with superphosphate this season were at least as good as those manured with coprolites.

To compare the composition of the turnips on the dunged and undunged plots, the analytical results can be inserted in Table XIV. Averaging the numbers, the following results are obtained: —Mean of ten plots with dung, dry matter 8·6 per cent. and 51·5 cwt. per acre, ash in dry matter 7·6 per cent. and 437 lbs. per acre. Mean of ten plots without dung, dry matter 8·95 per cent. and 43·2 cwt. per acre, ash in dry matter 6·7 per cent. and 323 lbs. per acre. There were 6 tons or 25 per cent. more bulbs on the dunged plots than on those that got artificials only, but the superiority is decreased by 5 per cent. if the dry matter of each be compared, or 1 ton of the increase is water. One-third more ash constituents are removed from the soil on the dunged than on the undunged plots. Indeed, the difference in the percentage of ash on these plots is very noticeable, as it is large, and occurs in all the plots compared.

As the application of artificial manures along with dung has been in most of the plots too liberal to be repaid by the increased produce, it is proposed to reduce the quantity of dung on the experimental plots in future seasons. The alternative of reducing the artificials might prevent their different constituents showing sufficiently distinct results. It has been suggested that plots containing bone meal would be of value as showing the comparative effect of nitrogen in a less soluble form, and it is proposed to substitute an equal money value of this manure for part of the nitrate soda and phosphates in plots 7, 8, 21, and 22, as these have merely given results intermediate between the plots with ground and dissolved phosphates.

Analyses and Prices of Manures.

Anaylsis of Lime applied (5 *tons per acre in Winter*).

	1882		1883.	
	Sample I.	Sample II.	Sample I.	Sample II.
Lime,	70·95	58·02	79·49	79·66
Magnesia,	2·65	2·36	1·66	1·72
Ferric oxide, alumina, and traces of phosphoric acid,	6·83	9·33	6·03	7·01
Sulphur trioxide,	12·63	16·44	1·73	1·55
Carbonic acid,			1·10	·94
Water,			1·62	·91
Alkalies and loss,			1·04	·41
Silica,	6·94	13·85	7·33	7·80
	100·00	100·00	100·00	100·00

The limes used in 1882 and 1883 were from different sources. Large samples were taken from trucks as delivered, so that each analysis represents the quality of a separate delivery. It will be seen that the lime used in 1882 varied much, while the other was constant in quality.

Analysis of Potash Salts.

These salts were sold as "sulphate of potash," of which they were guaranteed to contain 50 per cent., and were at the time the cheapest form in which potash could be bought. In a sense they fulfil the guarantee, but it is wrong to sell them as sulphate of potash, as the great bulk of the potash is in the form of chloride, and in this form is scarcely so valuable per unit of potash.

	1882.	1883.
* Sulphate of potash,	10·56	15·57
* Chloride of potassium,	39·45	31·10
Sulphate of lime,	3·28	4·13
Chloride of magnesium,	10·14	16·59
Chloride of sodium,	25·49	19·03
Insoluble matter,	3·47	4·02
Water,	7·88	9·80
	100·27	100·24
* Containing potash =	30·62	28·02
= Sulphate of potash,	56·62	51·82

Analysis of Ground Mineral Phosphate.

	1882.	1883.
* Phosphoric acid,	28·05	21·18
Lime,	36·68	35·57
Silica,	14·23	14·29
Water,	9·37	7·49
Alumina,	1·51	21·47
Ferric oxide,	7·92	
Carbonic acid, &c.,	2·24	
	100·00	100·00
* = Tricalcic phosphate,	61·24	46·24

The ground mineral of 1882 was sold as French high class phosphates. That used in 1883 was an oolitic phosphate, and said to be a true coprolite or dung stone. 75 per cent. passed through No. 90 wirecloth.

Analysis of Superphosphate.

	1882.	1883.
Soluble phosphoric acid,	11·34	11·95
= Tricalcic phosphate made soluble,	24·75	26·09
Reduced phosphoric acid,	1·64	1·05
= Tricalcic phosphate made soluble, but become insoluble,	3·59	2·30
Phosphates unacted on by acids,	none	none
Total phosphoric acid,	12·98	13·00
= Tricalcic phosphate,	28·34	28·39

These superphosphates were guaranteed to contain a minimum of 25 per cent. "soluble phosphates," and to be in a sufficiently dry and powdery condition for sowing. The "reduced" phosphate is included under the heading of Tricalcic Phosphate made Soluble, in the preceding Tables (II., V. &c.), as the phosphoric acid soluble in water soon assumes this form after application to the soil. In buying superphosphate, however, the "reduced" phosphates should not be included along with the soluble in the guarantee, for putting the same value on "reduced" as "soluble" phosphates induces the manufacturer to use a mineral containing much iron. It also introduces an element of uncertainty in the guarantee, for "reduced phosphates" are seldom determined, and if chemists are specially requested to do so, the various methods pursued are not sufficiently constant in their results. Moreover, reduced phosphates are inferior to soluble, inasmuch as they have lost at least their diffusive power.

Analysis of Nitrate of Soda.

The nitrate of soda was equally good both seasons, and contained 97 per cent. of the pure salt, 100 parts of that used in 1883 contained nitrate of soda 97·05, moisture=1·74, insoluble =·03, chloride of sodium=·91, and sulphate of soda=·27.

Prices of Manures per Ton.

	1882.	1883.
Superphosphate, ...	£3 15 0	£3 6 6
Ground mineral phosphate, . .	5 0 0	3 15 0
Potash salts, ...	5 15 0	5 5 0
Nitrate of soda, ...	14 5 0	12 6 6

Prices noted include carriage to Killearn Station. The manures were bought in the end of February each season, and the prices represent their value *at that time*, except the nitrate of soda used in 1882, which was ordered on 8th April. With the exception of the ground mineral used in 1883, the quotations were for considerable quantities, and for *cash* within a week after delivery. Had much ground minerals been used in 1883, it might have been bought for 7s. 6d. per ton less.

THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1883, AND METEOROLOGY OF THE YEAR RELATIVE THERETO.

THE CROPS.

THE following comparison of the cereal and other crops of 1883 with the previous year, has been prepared by the Secretary of the Society from answers to queries sent to eminent agriculturists in different parts of the country.

The meteorology of the year has been furnished by Mr Alexander Buchan, Secretary of the Meteorological Society of Scotland.

The queries issued by the Secretary were in the following terms:—

1. What was the quantity, per imperial acre, and quality of grain and straw, as compared with last year, of the following crops? The quantity of each crop to be stated in bushels. What quantity of seed is generally sown per acre?—(1) Wheat, (2) Barley, (3) Oats.
2. Did the harvest begin at the usual time, or did it begin before or after the usual time? and if so, how long?
3. What was the quantity, per imperial acre, and quality of the hay crop, as compared with last year, both as regards ryegrass and clover respectively? The quantity to be stated in tons and cwts.
4. Was the meadow hay crop more or less productive than last year?
5. What was the yield of the potato crop, per imperial acre, as compared with last year? The quantity to be stated in tons and cwts. Was there any disease, and if so, to what extent, and when did it commence?
6. What was the weight of the turnip crop, per imperial acre, and the quality as compared with last year? The weight of the turnip crop to be stated in tons and cwts. How did the crop braird? Was more than one sowing required? and why?
7. Were the crops injured by insects? State the kind of insects. Was the damage greater or less than usual?
8. Were the crops injured by weeds? State the kind of weeds. Was the damage greater or less than usual?
9. Were the pastures during the season of average growth and quality with last year?
10. How did stock thrive on them?
11. Have cattle and sheep been free from disease?
12. What was the quality of the clip of wool, and was it over or under the average?

From the answers received, the following statistics have been compiled :—

EDINBURGHSHIRE.—Wheat, 38 bushels, being less than last year; straw also much behind last year; 3 bushels sown. Barley, 48 bushels, being less than last year; straw also much behind last year; 2½ bushels sown. Oats, 60 bushels; straw behind last year; 3 bushels seed; the produce less, owing to a great drought in the early spring and cold summer. Harvest began about ten days behind the usual time, and was long and protracted, and expensive, without much damage. Hay, 2 tons, and behind last year; quality middling. Meadow hay crop less. Potato crop, 8 tons; quality good; Regents and early varieties generally one-third diseased after September; Champions and Heroes sound, or almost so. Turnips, 20 tons weight; much behind last year; quality good. Braired well when rain came, which was much too late; very little, if any, second sowing. No damage from insects; not a bad year for weeds. Pastures less than last year. Stock throve very medium, but there was very little disease; Clip of wool under average.

LINLITHGOWSHIRE.—Wheat much inferior as compared with last year; never ripened properly; from 20 to 30 bushels; seed, from 2½ to 3 bushels. Barley about the same in quantity, but inferior in quality; grain dark in colour, from 30 to 40 bushels; seed, 2½ to 3 bushels. Oats, straw less in quantity; grain, from 2 to 3 lbs. lighter, as compared with last year; from 30 to 40 bushels; seed, from 4 to 5 bushels. Harvest began about the usual time. Hay crop much the same as last year, from 2 to 3 tons. No meadow hay. Potato crop from 1 to 2 tons less as compared with last year; early varieties mostly bad with disease; commenced when ready to lift and spread rapidly. Turnip crop about the half as compared with last year; quality not so good; from 5 to 20 tons; great complaint of finger-and-toe; good braird; no second sowing. Almost no insects. Weeds not worse than usual. Pastures much inferior in growth and quality. Stock did not thrive well. Except a few cases of foot-and-mouth disease, and also of blackleg, cattle and sheep have been healthy. Clip of wool about an average.

HADDINGTONSHIRE (Upper District).—Wheat little grown. Barley about 35 bushels, of inferior quality, weighing 55 lbs. per bushel and much discoloured; straw under average; seed, 3½ bushels. Oats from 35 to 40 bushels, weighing 42 lbs.; high coloured, but sound; straw about average, but damaged by wet; seed 5 bushels. Harvest began 2nd September, same date as last year. Hay, first cutting under average, and well secured; second crop larger than usual. Meadow hay fair crop, and well secured. Potato crop from 5 to 6 tons, principally Champions and Magnum Bonums; little diseased; older varieties a poor crop, and half diseased. On good turnip soil, turnips have come to be nearly an average crop, having grown all winter; on clay land not half a crop; swedes on many farms a failure, having been destroyed by frost and fly after brairding, and had to be re-sown with common turnips. There was little damage by insects. Fallows usually foul this season, and required extra labour in cleaning. Old pastures good, but young grass not so good, being thin on ground. Stock did fairly well. Foot-and-mouth disease among ewes and lambs in spring caused serious loss on several farms. Ewe wool not so good; hogg wool an average crop, but very low in price.

HADDINGTONSHIRE (Lower District).—Wheat, 30 bushels, of poor quality; straw deficient; seed, 3½ bushels. Barley, 40 bushels; quality of grain deficient; straw short; seed, 2½ bushels. Oats, 50 bushels; about last year's

quantity and quality; straw rather shorter; seed, 4 bushels. Harvest commenced at or about the usual time, the last week of August. Hay about an average crop, 2½ tons. No meadow hay. Potatoes, an average crop of 9 tons, and comparatively sound; about 1½ ton more than last year; of the new varieties most planted was the Hero, as yet the best disease-resisting potato; takes about 15 cwt. seed. Turnip crop, 20 tons; rather under last year's crop, owing to dry weather in the month of June causing a slow braird; re-sowing necessary in some cases on account of drought. No injury by insects. In some cases wild mustard injured the crops. Pastures of average growth. Stock throve well, and were free from disease. Clip of wool an average.

Berwickshire.—Wheat, 27 bushels; quality indifferent; straw about 250 stones; seed about 3 bushels. Barley, 31 bushels; moderate quality; discoloured by weather; straw about 190 stones; seed about 2½ bushels. Oats, 39 bushels; quality average, but grain discoloured by weather; straw about 190 stones. Harvest about ten days later than usual, and the weather was generally very broken. Hay crop, quantity average; quality good; say 2 tons. Meadow hay crop not so productive as last year. Potato crop—Champions, say 6 tons; Reds, say 4 tons; comparatively free from disease. Regents a failure from disease; some "Hero" and "Magnum Bonum" were planted. Turnip crop fully two-thirds less than last year in regard to swedes, and one-half as regards whites and yellows. Swedes, say 8 tons; whites and yellows, say 16 tons; crop brairded badly, being damaged by frost; several sowings required, on account of failure of previous sowings. No injury by insects, and none by weeds. Pastures good, being fully average. Stock throve indifferently, owing to wet weather and frosty nights. Foot-and-mouth disease was prevalent among cattle and sheep. Wool, average quality and quantity.

Roxburghshire.—No wheat. Barley, 30 bushels; quantity sown from 2½ to 3 bushels; grain light, and deficient in colour and quality; straw about the same as last year in quality, but not in such abundance. Oats, 36 to 40 bushels; quantity sown from 4½ to 5 bushels; grain and straw the same as the barley. Harvest began the first week of September, about a fortnight later than usual. Hay, quality and quantity better. No meadow hay. Potato crop, disease began in July, but except in the earliest kinds was not bad; about 12 tons. Magnums planted free from disease, but not so good a crop as Champions. Turnip crop, quality good; about 12 tons. Pastures of average growth and quality; stock throve well, and were free from disease, except colds among horses. Clip of wool rather above average.

Selkirkshire.—No wheat. Barley, about 28 bushels, very much like last year, but grain very deficient in colour, and price much below average; seed about 3 bushels. Oats, a full average crop, 30 to 33 bushels, and where well secured of fine quality. Harvest about third week of August, and was irregular, as on the later parts of the county the crop was damaged by weather, while on some high farms it was very well secured, and both straw and grain are of fine quality. Harvest commenced about the usual time, from the 12th to the 15th August. Hay crop from 1 to 2 tons, scarcely so well made as last year; ryegrass and clover in fair proportions. Meadow hay also an average crop, although not so productive as last year; well secured in many cases, in others not so well, as weather was unsettled. Potatoes a good crop, about 4 to 5 tons; part diseased, but less so than last year; no newer varieties than Champion and Magnum Bonum, as they are still proving well. Turnip crop irregular, and on the whole under average, as the extra rainfall stopped their growth except on very dry soils. The

crop would not exceed 15 tons, and little re-sowing was required. No extra insects. Many crops were injured by the rank growth of the ordinary weeds which always appear in wet weather. Pastures of full growth, but not so good quality as last year. Stock did not thrive so well, owing to inferior quality of the pasture. The county is quite free from disease. The wool was of good quality, and about an average weight; but prices still rule low—about 10d. per lb. for Cheviot.

Peeblesshire.—No wheat. Barley will average about 32 bushels; the quality generally not very good; weight of straw about an average; not so good a crop as last year. There is now considerably less of this cereal grown than formerly. Oats, about 38 bushels; weight and quality of grain not up to last year; straw about an average; oats did not ripen equally, consequently there is a quantity of light grain. Harvest began about from ten days to a fortnight after the usual time; early ploughed land had, as is generally the case, the advantage both as to bulk of crop and being sooner ready for cutting. Hay crop would average about 30 cwt., a much lighter crop than last year, but generally well got. Meadow hay, a lighter crop than last year, and under average. The yield of the potato crop would be about 4½ tons, as compared with last year considerably less. Disease began to show itself, especially among Regents, early in October, and has increased in the pits, in many cases one-third of the tubers being affected. The weight per acre of the turnip crop would average about 15 tons; rather lighter than last year, and the feeding properties not so good. The crop brairded well, and in very few cases was second sowing necessary. There was little or no apparent injury done by insects. On well-cultivated land the injury done by weeds was very inconsiderable. Pastures were very late of coming away in the spring, and hill stock suffered in consequence. The quality of grass was good; stock generally throve well, and there was no disease in the county. The clip of wool, especially among hill stock, very much under the average, and very low in price.

Dumfriesshire (Upper Nithsdale).—No wheat and almost no barley grown. Oats under an average crop; quantity from 30 to 32 bushels, and a deal of light corn from not being well ripened. Harvest late, beginning about the 20th of September. Hay, a short crop, not over a ton, and under average quality. Meadow hay crop considerably less than last year. Potato crop above an average, about 5 tons; not much disease. Turnips, a much better crop than last year, 15 tons; quality good; brairded well; very little second sowing. Damage by insects not more than usual, and injury from weeds more than usual, in consequence of wet cold summer. Pastures under an average in quantity and quality, and neither cattle nor sheep made their usual progress. Not more than average disease; quality of wool clip under an average, and not quite average weight.

Stewartry of Kirkcudbright.—Hardly any wheat grown. Barley, 30 bushels, average quantity of grain; quality poorer, straw rather heavier; seed, 4 bushels. Oats, 50 bushels, average quantity; quality of both grain and straw much damaged by protracted harvest; seed, 5½ bushels per acre. Harvest ten days late. Hay crop, quantity 37 cwt.; similar quantity, but better got. Meadow hay, quantity 25 cwt.; much lighter; crop better got. Potato crop, quantity 8 tons; better crop; little disease; general complaints about smallness of Champions. No new varieties grown. Turnip crop, 15 tons; similar to last year's crop; regular braird; only one sowing. Injuiry by insects not appreciable; slight damage by grub on lea-sown corn. Not much damage by weeds, although great growth owing to wet season. Pastures above average growth; feeding quality considerably lower. Stock throve poorly, when no extra feeding

allowed, but were free from disease. Clip of wool, average quality and quantity.

WIGTOWNSHIRE.—Wheat, 25 bushels; quality not so good as last year; straw abundant, but badly harvested; seed, 3 bushels. Barley, 30 bushels; 52 lbs. quality; less than in 1882; seed, 3½ bushels. Oats, 36 bushels; 40 lbs. quality; a good crop; seed, 4¾ bushels. Harvest later by three weeks. Hay, 1 ton; good quality, but less than in 1882. Meadow hay, rather less. Potato crop, 8 tons; hardly any disease; Champions and Magnum Bonums, and little else planted. Turnip crop, 16 to 20 tons; good quality, and brairded well. Little damage by insects and weeds. Pastures hardly so good, owing to little sunshine. Stock throve moderately; there were two outbreaks of foot-and-mouth disease, but they did not spread. Clip of wool, nearly average in the hill districts; not so good on low lands.

AYRSHIRE.—Wheat early sown, with land in good condition, has given satisfactory returns; the best fields have yielded 36 to 50 bushels, weighing 60 to 63 lbs.; the later crops larger in area have yielded small quantities of inferior grain, much of it fit only for cattle food; the straw was bulky; about 3 bushels of seed is sown. Barley was a well grown crop; but a storm in August lessened materially the return, especially from exposed fields; but better class of land yielded 30 to 40 bushels, weighing 54½ to 55½ lbs. On cold and late soils, the yield was about 26 to 28 bushels of 51 to 53 lbs. Oats were a bulky crop, and gave large returns in fine early land; both quantity and quality good; but the crop came up thin on middling and inferior land in Carrick, and in the latest parts of Kyle it did not ripen; late crops in stook after the middle of October were half lost. Harvest nearly three weeks later than usual. Hay middling crop; less bulky than last year. Upland meadows rather deficient; well manured timothy grass, good returns. The beginning of potato raising was about ten days later than usual. The earliest crops paid well. The secondary crops did not swell rapidly in the cold July weather and with falling markets were unremunerative. Autumn crops have been mostly Champions and Magnums; the crop was fair, and little injured by disease. Middling turnip crop; it improved greatly in September and October. Pastures middling in early districts; rather deficient in the uplands. Stock throve moderately well, and there was not much disease.

BUTE.—Wheat, about 30 bushels; quality of grain and straw about same as last year, although less in bulk; seed, 4 bushels; not a great deal of wheat sown, and valued as much for the straw as for the grain. Barley about 34 bushels; quality of grain and straw much like last year, but less bulky; seed, 4 bushels. Oats, about 36 bushels; quality of grain and straw similar to last year's crop, although a good deal less in quantity; seed, 5 to 6 bushels. Harvest began two weeks later than last season. The white crops on early farms were pretty well got in, but in colder land harvest was protracted,—the season on the whole being rather wet and cold, with a want of sunshine. Hay rather under average of last season both for ryegrass and clover—quantity 1½ to 2 tons; pretty well got. Meadow hay less productive than last year; not much cut in locality, but pretty well got. Potatoes better crop than last year, and not so much disease; Champions mostly grown, return about 8 tons; other kinds, for early sale, about 5 tons. Turnips, 16 to 20 tons; fully better than last year on dry land, but worse on damp soil; crop brairded well, with no re-sowing; was slow in growth, but filled up wonderfully well in September and October. The crops were very little injured by insects, excepting oats on heavy lea land, which were hurt a good deal with grub-worm, owing to cold weather in May. Weeds

were more prevalent than usual—chick, yaur, and red-shank principally—owing to damp season. Pastures rather under average, both in growth and quality. Stock throve fairly well, considering season. Cattle and sheep were free from epidemic disease, no foot-and-mouth disease having appeared in Bute, although prevalent in some neighbouring counties. Clip of wool about average in quantity and quality.

Arran.—No wheat and no barley. Oats about 28 bushels; quality not so good; straw quantity up to average, but soft; seed, about 6 bushels. Harvest about three weeks after usual time. Ryegrass, quality good; quantity about 1½ ton per acre; scarcely as much clover as usual. No meadow hay. Potato crop better than last year—about 8 tons; about one-sixth part diseased; commenced about middle of August; no new varieties planted—mostly Champions, and have not kept well since lifted. Turnips not quite up to the average—about 16 tons per acre; brairded well; no re-sowing. No injury by insects or weeds. Pastures, average growth; quality soft. Stock did not thrive so well as in a drier season, but were free from disease. Quality of wool fair, but under average as to quantity.

Lanarkshire (Upper Ward).—No wheat. Barley, 38 bushels; quality light, and colour not so good as last year; 3 bushels sown. Oats, 40 bushels; quality fair, but both thrashing and milling badly; some late got in very bad quality; seed, 5 bushels; both straw and corn considerably less than last year. Harvest began about the same as last year; both years late. Hay crop, 1 ton 5 cwt., much less than last year, the rain too long in coming. Meadow hay crop about the same, perhaps a little less. Potato crop, 6 tons; no disease among Champions; Regents about one-third diseased—better crop than last year; Magnum Bonums, no disease; some Champions as high as 10 tons, and no disease. Turnip crop, 20 tons; not so good as last year; first sown well, others late or long in the ground until rain came, then well, but late, with a little turnip fly, but no re-sowing. Some corn bad with wire-worm, but not general. Wet land bad with yaur; wild mustard less than usual, turnip fly eating some of it. Pastures of average growth and quality with last year. Stock throve quite well, and were free from disease. Clip of wool under average.

Lanarkshire (Middle Ward).—Wheat, 35 bushels; quality inferior to last year; seed about 3½ bushels. No barley grown. Oats, 28 bushels; quality as good as last year; seed about 4½ bushels. Harvest about three weeks later. Quantity of hay less than last year—about 1¾ ton. Meadow hay less productive than last year. Potato crop more than last year; about 8 tons, diseased but not the extent of last year. Turnip crop about same as last year—about 20 tons; only one sowing as a rule. Pastures not of average growth or quality. Stock throve very moderately, but as a rule were free from disease. The clip of wool was about the average of last year.

Renfrewshire (Middle Ward).—Wheat, 30 bushels; second quality; average straw; 4 bushels seed. Barley, 36 bushels; good quality; straw average. Oats, 42 bushels; fine quality; straw under average; seed from 5 to 6 bushels. Harvest fourteen days after usual time. Hay crop, 2 tons; quality very fine. Meadow hay, little more than half a crop. Potato crop, 6 tons; a little disease in earlies, little in later sorts; yield under last year. Turnip crop, 20 tons; good braird; no second sowing. No injury by insects. Large crop of weeds, mostly chickweed; damage more than usual. Pastures very much below average. Stock throve fairly well. No epidemic except a few cases of foot-and-mouth. Clip of wool a little under average.

Renfrewshire (Upper Ward).—No wheat grown, and no barley. Oats, 30 to 40 bushels; straw nearly a third deficient; brairded well, but cold wet weather in June set the growth, and allowed grass and annual weeds to choke it; about 5 bushels sown; both grain and straw are deficient in quality, spoiled with wet weather at harvest time. Harvest about ten days late. Hay 1½ to 2 tons; it was a little deficient in weight, but was well got and good quality. Meadow hay crop would want a third of bulk, but was well got and good quality. Potatoes on good dry sharp soil were an average, but on heavy soil were very deficient; from 4 to 6 tons; nearly all Champions grown in this district; very little disease. Turnips brairded well, but the wet cold weather after thinning got soured, and on heavy land was not half crop, but on light soil did not suffer so much. No injury by insects. On account of so much rain, annual weeds got up—red shank, &c. Pastures average; not so good as last year. Stock did very well. Foot-and-mouth disease was on a few farms, but was got stamped out. Not a sheep district.

Renfrewshire (Lower Ward).—No information given as to wheat. Little barley in the district, but the yield deficient to that of crop 1882, not exceeding 26 to 28 bushels; from 3 to 4 bushels sown. Oats, after green crop, a very deficient crop; much inferior to last year; considerably under the average, both in the grain and straw, and cannot be estimated at more than half a crop. After lea the crop was better than the former crop, but not by any means up to the average; in some cases, which is pretty general in the higher districts, the yield being estimated at only 18 to 20 bushels. In the more favoured parts of the lower district the yield is estimated at about 27 bushels. The amount sown is 4 to 5 bushels. The straw after the lea crop, where early harvested, was in good condition, but that of the crop after green crop was overrun with weeds, which got ahead before the crop. Harvest began about the usual time, and was generally a good harvest. The hay crop was not up to the weight of crop 1882, and did not average more than from 1 to 1½ ton, but the quality was good, the weather being favourable for securing it; cold and frosty mornings checked the growth in May. The quantity of meadow hay was less than last year, but the quality good. The early kind of potatoes yielded a crop of from 4 to 5 tons, but disease destroyed about from 30 to 50 per cent. of the crop. Late kinds—Champions, Magnum Bonums, &c.—were free of disease, but were small, and did not yield more than the earlier kinds. On the whole, however, it was a more favourable season for the potato crop. The turnip crop was hardly up to that of 1882, but in most cases one sowing was sufficient; the average yield is about 16 tons. Damage by insects did not prevail, and the fly did not trouble the turnips. The wet weather favoured the growth of indigenous weeds, and prevented their being kept under. Pastures were decidedly inferior to those of 1882, both in quality and quantity. The stock did not thrive so well in consequence, but were free from disease. Clip of wool an average; few sheep in the district. The season was dull, little sun, and a heavy rainfall, which reached 68·83 inches.

Argyllshire (District of Oban).—No wheat sown. Barley so very late sown that no proper return can be given. Oats, about 5 bushels sown; average return about 4½ bolls; both grain and straw about one-sixth less than last year; quality of grain light; crop did not ripen well. The harvest began about the same time as last year, being about ten days later than the usual time. Ryegrass about 12 cwt. less than last year; clover much less than last year. Meadow hay about a third less than last year. Potato crop about 3 tons more than last year. The disease did not appear until the end of September, and had little or no effect on the crop; quality good. Turnip crop, the best for many years as regards quality and quan-

tity; brairded well, and no second sowing required. There was no injury by insects. Little or no damage by weeds. Pastures below the average of last year in growth. Stock throve fairly. No appearance of any disease among cattle or sheep. Good clip of wool, a shade less than the average.

Argyllshire (District of Lochgilphead).—No wheat and no barley grown. Oats not up to the average either in grain or straw; taking the crop all round, I do not think the yield will be more than 24 bushels; 6 bushels of seed used. The harvest began ten days to a fortnight later than usual. The only clover we have is grown with the rye-grass; the hay crop was inferior—the average would be but little, if at all, over 1 ton. Meadow hay less than last year, but nearly up to the average. Potatoes a good crop, fully 6 tons; nearly double last year's crop; very little disease; Walker's Early, Champion, Magnum Bonum, and Reading Hero. Turnip crop inferior to last year's; it brairded well, and only one sowing required. A little damage was done to the oat crop by the common grub. The season being very wet, the green crop, especially turnips, could not be kept so clean as it ought to be; it could not be said that there was any damage. The pastures did not graze well, and stock did not thrive so well as usual, but were free from disease, except braxy, which has been as prevalent as usual. The clip of wool was good; over the average.

Argyllshire (District of Cowal).—No wheat sown. Barley a fair crop, as far as appearances went while in the field, but it did not ripen well nor thrash well; about 32 bushels, and weight even below last year; seed, 4 bushels. Oats in some places a fair crop, but, as a rule, the bulk was deficient, and is thrashing a very poor return—about 28 bushels, and the weight from 35 to 38 lbs.; seed, 5 bushels. The harvest was about three weeks after the usual time, and even then grain was far from being ripe, which partly accounts for the small return and light weight. Except in a few favoured spots, the hay crop was very light, on an average not more than 18 cwt., but it was fairly well got, and the quality is fair. Meadow hay was also deficient in weight, and in many cases badly got; the weight per acre would be about 25 cwt. The crop of potatoes is much better than last year, and the quality very superior. The yield is about 5 tons, and though disease showed itself about the usual time, it did little or no damage. Reading Hero is the newest variety, and is likely to prove a success. Turnips an average crop—about 18 tons; brairded well, and no second sowing required. No crops were injured by insects except the oat crop, which was in many places damaged by grub to an unusual extent. Weeds were not worse than usual, except among green crops, which, owing to wet weather, could not be properly cleaned. Pastures were under an average growth, and the quality was not so good as last year. Stock made little flesh on pastures last year, and the complaint by fleshers has been that neither cattle nor sheep killed well. Cattle and sheep were quite free from disease. The clip was under an average, both in respect of quantity and quality.

Argyllshire (Islands of Islay, Jura, and Colonsay).—No wheat sown. Barley about an average. Oats are not thrashing well at all this year; about 20 to 23 bushels. Stackyards have not been so small for the last thirteen years as they are this year, and in consequence fodder will be very scarce for the stock. Harvest began after the usual time—about ten days later than last year,—but was got all secured in good order. Hay crop much about an average; the quality is good; well saved; no clover cut in this district; about 1 ton 5 cwt., or so. Meadow hay about an average; saved in better order this year than last year. Potato crop about 7½ to 8 tons; there was no disease in the Champions or Magnum Bonums, but the other earlier

sorts were very much diseased. I have two Early sorts reared from the seed that have done well; no disease; three years planted. Turnips are not nearly so good this year as last year; about 15 or 16 tons; the quality is good; no disease in them; brairded well; no second sowing required. Oats sown after the turnip crop very much injured by a small red worm, so much so that there was not half a crop on the most of the red land throughout Islay; never saw it half so bad before; the weather was very cold and wet for some time after sowing. The crops were not injured by weeds. The pastures were very good, and as good in quality as last year. Stock thrived very well. Cattle were free from disease, and very healthy; but braxy in sheep was very bad, and also a good deal of fluke. The quality of wool was about an average, and also the quantity.

Argyllshire (District of Inveraray).—No wheat grown, and scarcely any barley. Oats are scarcely so good this year; probably about 24 bushels. Straw much about usual; season cold and wet. Harvest was a fortnight later than usual; not begun till about the middle of September. Hay—both ryegrass and meadow—lighter than usual; not more than 3 tons quality about as good as usual. Meadow hay less productive. Potato crop better than usual—say 5 tons; scarcely any disease; quality very good; Champions and Magnum Bonums the principal varieties. Turnips not generally so good; not more than 9 tons; quality good; brairded fairly well; scarcely any re-sowing. No damage by insects. Season being very wet, weeds could not be kept down. Pastures scarcely the usual growth, and quantity not so good. Stock did not thrive so well as usual, but were free from disease. Clip of wool about average.

Dumbartonshire.—Wheat, 29 to 30 bushels; grain and straw superior to last year; seed sown, about 3 bushels. Barley not grown to any appreciable extent. Oats, 39 to 40 bushels; grain rather better in 1882; straw better in 1883, but quantity less; 3 bushels seed. Harvest about a week later than usual. Hay crop, 1½ to 2 tons; rather less than 1882, but quality very fine; clover not so abundant in hay as last year—not grown as a separate crop. Meadow hay only grown in the more highland parishes; quantity perhaps rather under 1882, but quality better. Potato crop, 6 to 8 tons; early varieties lifted before there was much disease; Regents, 30 to 50 per cent. diseased; Champions show more disease than formerly, and tubers are smaller; Magnum Bonums and Sutton's Hero are both coming into use, and are found satisfactory as to quantity yielded and resistance of disease. Turnip crop varied; on stiff land small crop, 10 to 12 tons, on warm light land in some instances fully 20 tons; quality good; grew late on into November; braird good, and very little second sowing required. No injury by insects, and rather less than usual by weeds. Pastures better both as to quantity and quality. Stock throve well, and were quite free from disease; clip of wool about an average.

Stirlingshire (Western District).—No wheat sown. Barley about 32 bushels; quality rather better than last year; seed, about 3½ bushels. Oats, 37 bushels; better quality; seed, 4 bushels. Harvest commenced about the usual time, and all finished ten days earlier; grain and straw superior to last year. Hay crop good, and well harvested—about 2 tons. Meadow hay nearly as productive as last year, and well secured. Potato crop very good; 7½ tons; fine quality, and not much disease. Turnips brairded well; no re-sowing was required; about 20 tons of bulbs of fair quality. No insects; about the usual quantity of weeds. The pastures were about the average growth. Stock throve very well, rather better than last year. Cattle and sheep have been free from disease. Clip of wool was good quality, and rather bulkier than last year.

STIRLINGSHIRE (Eastern District).—Wheat, 34 bushels; neither quantity nor quality so good as last year; an average bulk of straw; 3 bushels of seed. Barley, 34 bushels; equal to last year, but quality of grain not so good; straw an average; 3 bushels seed. Oats, 41 bushels; quantity and quality of grain and straw equal to last year; 4 bushels seed. Harvest began about the usual time, and in general crops were all secured in good condition. Hay, 28 cwt.; similar in quantity to last year; rather deficient in clover, but secured in capital condition, consequently much superior to last year's crop. No meadow hay. Potatoes—Regents, 6½ tons; one-third to one-half diseased, being better than last year both as regards quantity and proportion of disease; Champions, 5¼ tons, a poor crop—tubers being very small, but comparatively free from disease; a few Reading Heroes were planted, but the results have been very disappointing. Turnips—Swedes and early sown yellows, 15 tons; similar to last year, but those later sown did badly—about 12 tons; the seed brairded well, and no re-sowing was required. No injury by insects; a good deal of work was required keeping annual weeds in check. Pastures similar to last year in growth and quality; stock thrived well in the beginning of the season, but they made little progress after the first week in August. Cattle and sheep were free from disease, with the exception of a few cases of foot-and-mouth disease among cattle, but owing to the restrictions of the local authority these were not allowed to spread. Few sheep are kept in the district; wool may be taken as an average clip.

FIFESHIRE (Eastern District).—Wheat, 34 bushels; straw, 1½ ton; seed, 3 bushels; quality inferior. Barley, 36 bushels; straw, 18 cwt.; seed, 3 bushels; quality not so fine as last year. Oats, 44 bushels; straw, 22 cwt.; seed, 4 bushels. Harvest was late, fully a week after the usual time. Hay crop, 25 cwt.; both ryegrass and clover inferior to crop 1882. Meadow hay, none grown. Potato crop, 5 to 6 tons; Champions and Magnum Bonums pretty sound, and have kept well; a few Heroes grown, but not generally liked. Turnip crop, 12 tons, one-third less than last year; brairded middling; partly re-sown. No injury by insects; little injury from weeds, damage less than usual. Pastures fully average growth and quality. Stock throve satisfactorily, and were free from disease; clip of wool an average.

FIFESHIRE (Middle District).—Wheat, quantity and quality below last year; average yield about 24 bushels, much of it under 60 lbs. per bushel; seed about 3 bushels. Barley, average yield 31 bushels; quantity, quality, and weight under average; grain dark in colour from want of sunshine; seed from 2½ bushels where drilled to 3½ broadcast. Oats not quite so good as last year; yield about 40 bushels; some fields stagg-rooted, and therefore full of grasses; seed, 3 to 5 bushels. Harvest later than usual; began first week of September, being a week later than previous year. Hay not so good as last year; yield about 1¼ tons, generally secured in good condition. No meadow hay. Potato crop better than last year; yield about 5 tons. Regents one-third to one-half diseased. Disease appeared beginning of August; Champions and Magnums little or no disease. Small quantities Reading Hero planted, and generally give satisfaction, quality and yield being good, and scarcely any disease. Swedes did not come away well, and a considerable extent was re-sown with yellows; turnips generally not much above half an average; although, on some rich, easy land, were not early stored, they will approach an average; yield about 12 tons. No injury from insects, and not more or less than usual by weeds. Pastures not up to the average in growth or quality; want of sunshine. Stock throve only moderately well. There were four or five serious outbreaks of pleuro-pneumonia in the early spring, which have been successfully stamped out. There were also outbreaks of foot-and-mouth disease in the spring and autumn, which have also been stamped out. Clip of wool barely average.

Fifeshire (Western District).—Wheat, 32 bushels; grain not as good quality; straw much the same as last year for quality, rather less in quantity—dull season against quality; seed, 2 to 3 bushels. Barley, 36 bushels; grain slightly deficient in quality; straw much as last year for quality, rather more in quantity; fine seed bed encouraged growth, but dull weather against quality; seed, 2 to 3 bushels. Oats, 42 bushels; much the same for quality and quantity of grain and straw; season more favourable for oats than other cereals; seed, 3 to 4¼ bushels. Harvest fully a week later than usual. Hay crop, 32 cwt.; much the same as last year; rains in July too late for hay crop; quality much as last year. No meadow hay. Potato crop, 5 tons; little disease came in at the end; few new varieties; results indifferent. Turnip crop, 12 tons; fair braird, one sowing; July rains much against turnips on all strong lands. No damage from insects; a good deal of chickweed, encouraged by the damp weather. Pastures of average growth and quality. Stock throve fairly well, and were free from disease; clip of wool an average.

Perthshire (South-West District).—Wheat well enough harvested, but a poor crop—not more than 30 bushels; seed, 3 to 4 bushels; quality of straw coarse; not much thrashed out yet, but weight unsatisfactory, and sample inferior. Barley of bad colour, but better filled and heavier than last year; weight 50 to 54 lbs. per bushel; straw middling, produce 38 to 40 bushels; seed, about 4 bushels. Oats the best crop of the season; return about 40 bushels, and up to 44 in good land; straw more bulky and better quality than last year, except in late situations, where both grain and straw suffered from exposure; seed, 5 to 6 bushels. Harvest began ten days later than usual, but weather favourable for a month; afterwards the reverse, and a good deal of crop damaged. Hay a fair average crop, and fairly well got; quantity 30 cwt. or so. Meadow hay, quality not so good as usual, season not being favourable for marshy land; where early handled a considerable quantity was well made, but much was damaged by weather and flooding of rivers. Potatoes a good crop; early varieties damaged by disease to the extent of one-third and upwards; Champions and Magnum Bonums, merely touched by disease, will be remunerative. Turnips in kindly open soils a fair crop, but in stiff soils quite the reverse, and very much injured by finger-and-toe; not much affected by fly at seed time, but spoiled afterwards by wet ungenial weather; good crops; 20 tons diseased, fields about half as much and often less. Crops not much damaged by insects. In stiff wet soils weeds very troublesome; in fact, the fields could not be cleaned, and weeds and young plants were frequently seen growing together after hoeing. Stock did not thrive well on pastures as a rule throughout the season, owing to the prevalence of wet weather, but on the whole they were free from disease till lately. Indeed, very few sheep have suffered from foot-and-mouth in Scotland, nor were many cattle affected until they were taken off pastures. The clip of wool has bulked well, and is of fair quality—rather over an average.

Perthshire (District of Coupar-Angus).—Wheat, a small crop, much under crop of 1882, and grain inferior; the yield on good land might be about 30 to 32 bushels; seed, 3 to 4 bushels, according to the quality of the land; small crop of straw. Barley was undoubtedly the cereal crop of the season in this district; yield, 32 to 50 bushels, much the same as in 1882, and selling at about same price—25s. to 30s. per quarter; seed, 2 to 4 bushels; straw above average; weight, 54 to 56 lbs. Oats nearly equal to crop of 1882, but not quite; yield 40 to 50 bushels, weighing from 40 to 43 lbs.; the oats having been cut pretty green, the straw is generally good quality for fodder; seed, about 4 bushels. Harvest commenced about 1st September, a few days later than in 1882; the harvest was an exceptionally

favourable one, and with rare exceptions the crops were well got. The hay crop was a small one, about 1½ to 1¾ ton, and of only moderate quality, being short of clover in a good many instances. Farmers who cut their hay early had their crop greatly damaged, but those who waited till the weather cleared up secured their hay in good order. The quantity of meadow hay grown is very insignificant. A fair crop of Magnum Bonums and Champions, from 5 to 6 tons—a little disease in these varieties, but that very trifling; Regents little grown, but where grown they were badly diseased; Reading Hero, a new variety, has been found more diseased than Champions and Magnums, and is also a much smaller cropper. The turnip crop is variable; in many instances it did not braird well, and required re-sowing; the crop also in very many instances made little progress during summer. There are all kinds of crops in the district—the full crop of over 20 tons, the half crop of 10, and the failure complete or partial. A good deal of injury from the turnip fly in the earlier part of the season, but not so much as in some previous seasons. On account of excessive rains in the summer, turnips became so smothered with weeds as to be almost unmanageable—in some cases, indeed, the weeds obtained complete mastery. These weeds were charlocks, chickweed, couchgrass, and coltsfoot. Pasture grass was not nearly so abundant as in 1882. Stock throve moderately well. Both pleuro and foot-and-mouth disease were in this quarter in 1883, but the district is presently clear of both; cattle from Ireland brought both diseases. The quality of wool and weight both over average, but prices quite disheartening.

Perthshire (Western District).—No wheat grown, and hardly any barley. Oats fully up to the average. Harvest about a fortnight later than the average. Ryegrass a good crop. Meadow and natural hay, fully up to the average. Potato crop, fully up to the average; not much diseased. Turnips, an average crop; one sowing sufficed. No injury by insects to any extent, and none from weeds, excepting where bad farming existed. Pastures, average growth and quality. Stock throve very well, and were free from disease. Clip of wool fully average, weight and quality good.

Perthshire (Lower Strathearn).—Wheat, 30 bushels; bad crop, owing to little winter wheat being sown owing to wet autumn; 3 bushels sown. Barley, 32 bushels; quality not as good as last year and less extract; colour bad; 3½ bushels sown. Oats, 44 bushels, good quality; much the same as regards quantity and quality as last year; 4 bushels seed sown. Harvest began about usual time. Hay 1 ton 10 cwt.; bad hay harvest, and a large quantity damaged, and meadow hay much the same. Potato crop, 4 tons 10 cwt.; Regents very much diseased; Champions and Magnums very little diseased; quality fine; no new varieties planted. Turnip crop would not average 10 tons; not much over half a crop; swedes brairded badly owing to dry weather at the time; not much turnip fly. No injury by insects and none by weeds. Pastures of average growth and quality. Stock throve fairly well, and were free from disease, except a few cases of imported foot-and-mouth disease. Clip of wool an average.

Perthshire (Highland District).—No wheat grown. Neither the quantity nor quality of barley so good as last year—from 28 to 32 bushels; weight from 48 to 50 lbs.; straw deficient. Oats from 32 to 36 bushels; weight from 38 to 40 lbs.; much *shag;* quantity sown, 5 bushels; straw deficient. Harvest same date as last year; weather excellent. Hay, under the average—18 cwt.; fairly well secured; average quality; ryegrass and clover equal. Meadow hay, fair crop—4 or 5 cwt. less than last year. Potato crop, inferior; small in size; 2½ tons; no disease; well secured,

keeping well; quality very good. Turnip crop under average; early sown better than the last sown; very bad in appearance till October, when they began to improve; average from 15 to 17 tons; no second sowing; brairded well. Insects did no harm; weeds got up a little during wet weather, but not so bad as last year. Pastures very fair, not equal to last year in rankness, but quite as nutritive. Stock throve well, and have been free from disease. Clip of wool, 12 or 13 per cent. better than average.

Perthshire (Dunkeld and Stormont District).—The wheat crop this year is inferior to last year in quantity and quality as regards both straw and grain, the average yield per acre being 32 bushels; weight, from 50 to 55 lbs.—6 bushels less than last year; this attributed to want of sunshine; quantity sown, 3½ bushels. In general the yield of barley is as good as last year—average yield, 40 bushels; weight from 53 to 55 lbs.; quality of grain and straw good; quantity sown, 4 bushels. Average yield of oats 44 bushels, weight 41 lbs.; quality of both grain and straw good; quantity sown, 5 bushels. Harvest commenced about the beginning of September, about two weeks later than last year. Quantity of clover hay 2 tons; quality much better than last year, being secured in good condition. There is very little meadow hay in this district; it is much the same as last year. Potatoes in well cultivated fields are a good crop; Regents 5 tons, much diseased; Champions about 7 tons, with very little disease; Magnum Bonums, 7½ tons, no disease; Heroes a poor crop; disease observed to commence about the end of August. Turnips have been a failure in a great many places, while on some farms they are a very good crop; weight from 10 to 25 tons; braird good on some farms, on others much destroyed by fly. The crops have not suffered much damage from insects; a few fields were damaged by wire worm and grub. Soft weeds very prevalent this year, especially among green crops. Grass much the same as last year. Stock did very well on the grass, but owing to the very high price of lean cattle the parks were not as well stocked in general as last year. There has been no disease among sheep and cattle. Wool much the same as last year.

Forfarshire.—Wheat, about 30 bushels; straw inferior; about 3½ bushels sown. Barley, about 40 bushels; quality inferior; about 4½ bushels sown. Oats, about 44 bushels; quality of grain and straw good; about 5 bushels sown. Harvest about a week later than average of years. Hay crop, about 1½ ton; quality good. No meadow hay grown. Potato crop not so heavy as last year—about 6 tons; tubers small; not much disease. Turnip crop, from 10 to 16 tons; quality good where not diseased; crop brairded well; no re-sowing required. No injury by insects, and not more than usual from weeds. Pastures not an average growth, and stock did not thrive so well as last year, but were free from disease except foot-and-mouth. Quality of wool good; clip about 6 lbs.

Aberdeenshire (District of Buchan).—Wheat not grown to any extent. Barley or bere nearly equal to last year in grain and straw—about 40 bushels, or 5 qrs., and from 3 to 4 bushels used for seed; barley and bere are generally sown on best land; the weight this year is from 3 to 5 lbs. under last year. Oats about one-third under last year—about 32 bushels; weight from 38 to 41 lbs.; average quantity sown, from 5 to 6 bushels; straw, mostly of fair quality, was a good deal laid and twisted. Harvest a week later than the usual time; some of the crop stood long in stock owing to the wet weather in the fore part of harvest, and part was secured in rather damp condition. Hay crop not much over half of last year; average 1¼ ton; quality good, and secured in good condition. Not much meadow hay in this district; about same quality as last year, but not so well

secured. Potatoes about 7 tons; quite as good as last year; Champions all but free from disease, while other varieties are more or less diseased. Turnips very unequal; while on some farms the crop is fair as regards both swedes and yellows, on others there is a very poor crop; taking the district, there is not over half the crop of last year; a good deal of re-sowing had to be resorted to, and in some cases a third time; the land is not nearly so clean from weeds as last year. Only the turnip crop and part of the crop after lea were injured by insects—the former by the turnip fly and the latter by grub. Turnip crop a little injured by annual weeds. Pastures nearly an average growth, but quality not so good. The stock did not thrive so well as they should have done. Cattle and sheep have been free from disease; although foot-and-mouth got a hold in spring to a small extent, it was eradicated, and the district has since been free from disease. Clip of wool an average.

Aberdeenshire (District of Formartine).—Wheat very little grown. Barley and bere extensively grown; owing to the severe droughts in the months of April, May, and June, with cold north-east winds, this crop did not make such progress as could have been wished. There is not nearly so much straw as last year; and the quantity and weight of grain very disappointing. The grain stood long in the stook after being reaped, causing discoloration of the grain. The quantity would be about one-third less than last year, with a large proportion of very light unmatured grain. The weight per bushel, 49 to 51½ lbs.; quantity sown, 4 bushels barley, and 3 bushels bere. Oats, this crop also suffered by a long spell of cold weather, hard winds, and insufficiency of moisture, which checked the growth of the oats in the month of April; and as May and June also remained cold and droughty, this crop never recovered the check. The quantity of straw would be one-third less than last year, and the quantity of grain very much less—about 24 to 32 bushels, instead of 40 last year. The lack of forcing, sunshiny weather at the proper time, when the ear of the grain was maturing, is the cause of the lightness of the grain, which weighs from 39 to 41 lbs. per bushel; quantity sown, 6 bushels. Harvest was rather more than a week later than last year. The hay crop, which is said to be made by the month of May, suffered so much by the absence of genial weather at this time, that when cut down the crop was found to be very deficient in bulk; and a deal of it was spoiled by exposure to rain after being mowed; quantity, about 1½ ton. No meadow hay. Potato crop not so abundant as last year; this year about 4½ tons, with a larger proportion of small tubers; little or no disease, and of fine quality. Turnips are a very disappointing crop. The fact that turnips have again failed to such an extent raises a serious question. It is becoming more difficult every year to produce a good sound crop of turnips. Farmers realise this fact, and the question that has begun to be asked is whether it is wise to risk so much on a crop that so often disappoints cultivators. In this district so much depends on turnips that it is not easy to find a substitute in vegetable form, and farmers by the force of circumstances, as it seems to them, are under the necessity of continuing to spend many thousands of pounds every year on one of the most uncertain crops of the farm. It yet remains to be seen how far researches of science may be of use in finding a remedy for some of the ills the turnip is heir to. It would be impossible to give an accurate statement of the weight, as some fields are a perfect failure, and others not half a crop, while a good field is the exception; in fact, the turnip crop this year is the worst that has been in this district since the cultivation of the root was first introduced. No damage by insects, except the fly in the turnip crop. No damage done by weeds, although the land had to be gone over oftener than had the crop been a good one. The season has also been a bad grazing year, and where there was a full stock,

and cattle and sheep turned out on the fields early, it was kept short all season, the cold dry weather being adverse to growth; cattle and sheep did not thrive well, but were generally free from disease. One outbreak of pleuro-pneumonia occurred from Irish cattle being brought into the district; it was stamped out, and did not spread further. Inoculation was tried on the whole of the home stock, and was very successful; the only defect was that some of the cows lost part of their tails, but all recovered. Foot-and-mouth disease was immediately put down, and the county has been free from all contagious and infectious disease for a length of time. Clip of wool an average; the price of wool has been very disappointing.

Aberdeenshire (District of Garioch).—Scarcely any wheat sown. The yield of barley is under that of last year by fully 4 bushels, and the weight is also less; 54 lbs. is exceptional, but 50 to 51 lbs. may be stated as an average, and 38 bushels; the quantity used for seed, 4 to 4½ bushels. The oat crop is very disappointing, both in quantity and quality; the return is at least 6 to 8 bushels less than last year, whilst the weight is only from 34 to 40 lbs. The cold dry weather during the formation of the ear probably laid the foundation of the deficiency, and the average return in all likelihood will not exceed 32 bushels; seed, 6 bushels. Harvest was commenced from 10th to 12th September, or about a fortnight to three weeks later than usual. The crop of hay also participated in the general shortcoming, and the yield declined about 10 cwt., which brings down the crop to 1 ton 4 cwt.; but it is stated that the yield of ryegrass is above an average. No meadow hay. Disease existed to a more or less extent amongst the different varieties of potatoes, but the Champions, although of smaller size than usual, were all but free of that infliction, and the yield would be the same as last year, viz., 4½ tons. Last year the Garioch Turnip Growing Association reported the crop of last year as one of the best since the formation of the Society, but that of this year light and a deal of disease; the average all round will not exceed 14 tons, or about 6 tons less than last year. The crop brairded nicely, and came well forward to the hoe, and everything apparently in favour, till after the heavy rainfall in July and August, when disease made rapid progress. No damage to crops was sustained by insects. Land kept clean, and no damage is sustained by weeds. The pasture grass was longer in coming forward than usual, but after a time it did fairly well; but stock, as is usual now-a-days, made but very little progress on it. Both cattle and sheep have been remarkably free from disease. The clip of wool was similar to that of last year.

Aberdeenshire (District of Strathbogie).—No wheat grown. Bere and barley were a fair crop as regards quantity of straw and grain, but the quality is very poor, the weight being from 47 lbs. to 51 lbs.; the average yield is about 34 bushels; the quantity of seed sown is about 4 bushels. Oats after lea were fully an average crop as regards bulk of straw, and very deficient in bulk after turnips; the yield of marketable grain per acre is very poor, there being little over 30 bushels, and the weight from 35 to 39 lbs., the latter weight being exceptional; the quantity generally sown is from 4 to 6 bushels. Harvest was about three weeks later than usual, not being general till the last week of September; the weather at the beginning was very wet and unsettled, but the crop was stacked in the end in better condition than it has been for years. The hay crop was a very light one, being generally deficient in clover; the average weight would not exceed 20 cwt. No meadow grown. Potatoes were, as a rule, a fair average crop, Champions and Magnums being fully so; the weight would be about 6 tons; disease was not very prevalent, unless among the early varieties. The turnip crop may be characterised as the worst since 1872; the general average weight does not exceed 10 tons—in many instances finger-and-toe has

reduced the weight to 5 tons; the crop was very stiff to braird, and in general a second sowing was required, and in many cases a third. Frosts in May, and the ravages of the turnip fly, account for the deficiency. Unless the turnip crop, no other was damaged to any extent with insects. Weeds were very abundant, and were difficult to eradicate owing to the extremely wet season. Pastures were deficient in growth, and stock as a rule made little progress in fattening, owing to the cold wet weather. Cattle and sheep have been free from disease, unless in one instance where a few sheep had the foot-and-mouth disease. The clip was about an average.

Banffshire (Lower District).—Almost no wheat grown. Barley, 27 bushels; quality below average, or one-fourth less than last year, and 3 lbs. lighter in weight. Oats, 27 bushels, or about one-fourth less than last year, and from 3 lbs. to 3½ lbs. lighter in weight. Harvest eight days later than last season. 17 cwts. of ryegrass, and quality inferior to that of last year. No meadow hay. Potato crop, 3½ tons; quality excellent; almost no disease; Champions grown chiefly. Turnip crop, 13 tons; quality not nearly equal to that of last year; brairded unequally; not much re-sowing required. Fly was troublesome in many places. No injury by weeds. Pastures not equal to last year. Stock did fairly well, and were quite free from disease. Clip of wool about an average, but comparatively few sheep kept.

Banffshire and Morayshire (Upper District).—Morayshire: Grain and straw both deficient; colour and weight both bad as compared with last year; grain would be a quarter short, weight and colour being equally inferior. No wheat grown in Upper Banffshire. Barley—Morayshire: Both straw and grain an average crop, but grain defective both in colour and quality; weight fully 2 lbs. under average. Banffshire: Straw a full crop, but grain under average; quality variable, but all very inferior; weight, the best from 2 to 4 lbs. under standard, and on late farms that deficiency much exceeded, cause want of sunshine. Oats—Morayshire: Straw and grain fair average bulk, colour and ripeness both satisfactory; weight defective, average from 2 to 3 lbs. under ordinary years. Banffshire: Straw fair bulk, quantity of grain deficient and not ripe, but weight 3 lbs. under average, down to shells in the late glens, in which the straw also was deficient. In both counties the harvest was fully a month later than usual, and in the late districts the crop never ripened. In both counties hay was a fair crop, not less than last season; but owing to the rains in July and August, there was greater difficulty in saving the crop, which on that account is defective in quality. No meadow hay grown. Potatoes—Morayshire: A full crop, without disease; quality good. Banffshire: Crop barely an average; quality fair; no disease. Turnips—Morayshire: Crop about two-thirds of an average weight; brairded fairly; disease, canker, and finger-and-toe prevalent. Banffshire: Under half an average crop, and on clay bottomed fields more or less a perfect failure. No damage from insects, nor any special damage from weeds. Pastures under average growth. Stock throve indifferently, owing to the cold wet weather, but were free from disease. On low ground farms whitefaced wool was an average clip; on the higher pastures and among hill flocks, owing to the storms in March, the clip was under an average; 1883 was the most defective for the last twenty-seven years. The loss from the turnip crop alone would be equal to a third of the rental in Morayshire, and a full half in the upper districts. Prices are good for stock, bad for wheat and barley, but fair for oats.

Morayshire (Lower District).—The wheat crop as to quantity, both straw and grain, is considerably under last year's crop; in general it was

very thin on the ground, on account of the extremely wet autumn; the seed was put in with the hand in bad condition; in spring it was much injured by a frosty gale of wind for some days; and in May no one perhaps saw the crop look so bad; the average will be one quarter below last year; the weight of grain about the same; seed sown, from 3 to 4 bushels. Barley, as to grain and straw, quite equal to last year both as to quantity and quality; but the bulk of straw is at least one-fifth under last year, the result of the extremely dry weather during the months of May and June; when rain came the straw lengthened out wonderfully, but it wanted strength, and was easily laid; the average would be for the "Laigh of Moray," 32 bushels; the seed, 2½ to 4 bushels. Oats are under average both as to quantity of grain and straw; the drought referred to injured the crop at an early stage. The quality of the grain is 2 lbs. per bushel below the average, and 1 lb. per bushel under last year's weight; while the quantity of straw would be one-fourth under. The lightness of the grain seems to be unaccountable; as the summer in the district was not unusually wet, there was a want of sunshine, but weather mild; seed used, 3 to 4 bushels. Harvest began about same time as last year, fully a week later than the usual time; was general in the last week of August; very little rainfall, but the weather was very close and misty, with great absence of drying wind; the crop was not as a whole well harvested. The hay crop, as a whole, would not be much above the half of last year's, which was an extreme crop; the drought of May ruined the crop in many cases; it was not 10 cwt. per acre, and the average would not be more than 25 cwt. Little or no meadow hay. The potato crop was considerably higher than last year's as to weight, with very little disease; the quantity would average from 2 to 7 tons per acre; the quality very good, with the exception of Magnum Bonums; no new variety was planted to any extent. The turnip crop is perhaps the most deficient in quantity and quality, of any for many years. The dry weather in the beginning of June prevented a good deal of the seed from vegetating till a late period; in such cases the crop was consequently very light; really good fields are quite the exception; finger-and-toe and canker has been more prevalent than in any former season; the crop would be one-third below last year's, and would average from 3 to 20 tons per acre; not a very great re-sowing was required. No special damage from insects, and not more than ordinary from weeds; but by far too many weeds are to be seen; a far more perfect state of cultivation would be advantageous. Pastures rather under average growth and quality, and fully one-third under last year's quantity. In general the pastures were too bare for stock making satisfactory progress; cattle in general came off them in leaner condition than ordinary, but were free from disease. The clip of wool would be rather under the average.

Nairnshire.—Scarcely any wheat grown. Barley much the same in quantity, but quality lighter; 3 to 4 bushels sown. Oats about average quantity, but light in weight; 4 to 6 bushels sown. Harvest began 1st September, say three weeks after usual time. Hay crop light. Potato crop good; very little disease. Turnip crop fair, but in some places very much affected with finger-and-toe. Pasture of average growth and quality. Stock throve fairly well, and were free from disease.

Inverness-shire (District of Inverness).—Very little wheat sown; quantity about 30 bushels average—quality fair; owing to moist summer, crops were lodged, and quality of straw inferior; about 3 bushels sown; quality similar to 1882. Yield of barley on best land, about 40 bushels; quality soft, and light in weight; straw soft, in consequence of wet weather; about 3 bushels average seeding on best land, and 4 bushels on poorer land; average weight about 54 lbs., compared with some 56 lbs. in 1882;

the yield on poor land will not exceed 20 bushels. Oats, a fair crop as regards bulk, but the quality very inferior on most of the best and average lands; weights disappointing; return about 32 bushels on good land; in late districts much of the grain considerably damaged. Harvest later by about two weeks than usual. Quantity of hay crop, about 1½ ton, on good land, compared with 2½ tons in 1882; quality inferior, and much difficulty experienced in securing it. Very little meadow hay. Potato crop, average on good land about 7 tons—quality excellent; some disease prevalent, but the large return counterbalanced and the yield is satisfactory, but prices low; at least one-third more quantity, and one-third less price as compared with last year. Turnip crop about one-third less on the average on best soils, and one half in many instances; the average yield will not exceed 15 tons, while much is considerably under that quantity, and few above it; braird was stiff, and considerable amount of re-sowing resorted to on clayey soils. Not much damage by insects. Greater damage than usual by charlock and ragweed. Plenty of pasture, but the moist nature of the season prevented stock thriving so well as usual. Stock throve fairly well, but not so well as in 1882, but were free from disease. Clip of wool about an average.

Inverness-shire (District of Beauly).—Little wheat sown, but average about 36 bushels; quality of grain not so good as last year, and straw also inferior, owing to wet season; quantity sown, 3 bushels. Quantity of barley, 38 bushels; about 3 lbs. lighter than last year, say 53 lbs.; 3¼ bushels sown. Quantity of oats, 40 bushels; about 2 lbs. lighter than last year, say 40 lbs.; quality good; 5¾ bushels sown. Harvest ten days behind usual time. Hay crop, 1 ton 16 cwt.; quality good, same as last year. No meadow hay. Potato crop, yield 8 tons; disease only in earlier sorts, commenced about end of August; Magnum Bonum only new variety planted, excellent crop and sound. Turnip crop, weight 20 tons; quality about equal to last year; braird rather stiff for want of rain; very little second sowing required. Finger-and-toe disease prevalent to some extent on various farms. Little injury done by insects, and little or none by weeds. Pastures of average growth and quality, especially during the earlier part of the season. Stock throve excellently, and were free from disease. Clip of wool about an average.

Inverness-shire (Skye).—No wheat grown, and little or no barley. Oats, quantity sown same as last year; yield considerably below average years, on account of late harvest. Harvest commenced about two weeks later than former years, and crop not wholly secured for a month after usual time. Hay crop up to average of former seasons, both in weight and in quality; and the same applies to the meadow hay. Potatoes, best crop since 1846; no disease, and the island much benefited by the introduction of new seed. Turnip crop, average a little below former years; crop brairded well; one sowing. No injury by insects, and weeds were much about the same as in former years. Pasture same as formerly. Stock rather back in condition, on account of incessant wet and high winds, but were free from disease. Clip of wool, average of former years.

Inverness-shire (Lochaber).—No wheat or barley grown. Oats, 30 bushels; grain and straw better than in 1882; seed, 6 bushels. Harvest about ten days later than usual. Hay crop, 1 ton 12 cwt.; quality superior to last year. Meadow hay crop, about the same as last year. Potato crop, yield better than last year—about 5 tons; no disease; no new varieties planted. Turnip crop about 20 tons; quality not so good as last year; brairded well, and no second sowing needed; suffered from excessive wet and dark weather. No damage by insects, and nothing more than

usual by weeds. Pastures rather above the average. Stock throve well, and were free from disease. Clip of wool under average in bulk and quality, the result of the dark wet summer.

Ross-shire (Western District).—No wheat, and very little barley. The yield of oats will not exceed 2½ quarters, or 20 bushels; as a rule, not so good as last year. The quantity generally sown is from 5 to 7 bushels; the summer being cold and the autumn very wet, is the cause of the deficiency and inferior quality. The harvest was from a fortnight to three weeks later than usual. The quantity of the hay crop will not exceed one ton, and the quality not near so good as last year, owing to the unfavourable season. Meadow hay less productive, not exceeding one-half of last year's crop; the quality indifferent. The potato crop as a rule was the most abundant, and the quality better than has been for many years; there was very little disease; Champions seem to have suited best; the yield would be about 10 tons. The weight of the turnip crop will be about 8 tons, and the quality not equal to last year; brairded well, and no second sowing required. No injury by insects. Owing to the wet summer, weeds were very troublesome to keep down; chickenweed was the most abundant. Pastures not equal to last year. Stock throve tolerably well, but not equal to last year; were quite free from disease. The clip of wool was good, and above average.

Ross-shire (District of Dingwall and Munlochy).—Wheat, quantity and quality of grain much below last season; quantity not more than 24 bushels; quality 2 to 3 lbs. per bushel below average; quantity of straw was less, as the crop was thin in the ground owing to the very late spring; quality fair; seed 3 to 3½ bushels. Barley quantity a fair average, say 36 bushels; quality at least 1 lb. per bushel below average; quantity of straw up to average of seasons, and of good quality; seed 3¼ to 3½ bushels. Oats, quantity deficient, quality barely average; quantity of straw much less than last season, quality a fair average; crop was thin on the ground, owing to a late seed time and cold season; a second growth came on in June to thicken the crop, but the pickles on this growth did not fill; yield, say 3 bushels. All the cereal crops suffered from a lack of the usual heat and sunshine and from too much wet. Harvest began about 7th September, fourteen days later than the average of seasons; the first weeks were very threatening from wet, the latter weeks were very drying. Hay crop average in quality, though a little less than last season; quality fair; clover grew well. No meadow hay. Potato crop lifted small in size, though numerous; quality very good. Disease appeared in August, older varieties affected from 10 to 40 per cent.; Magnum Bonums nearly free; quantity up to average. Turnip crop unequal and inferior; finger-and-toe disease more prevalent; weight not over 12 tons; crop brairded well, and not much second sowing required. No injury by insects, and not more than last season from weeds. The growth of pastures began later in the season, but was kept up quite as long as usual. Stock on the whole throve well, and were free from disease excepting two outbreaks of pleuro. Clip of wool—quality was fair, quantity rather under the average.

Ross-shire (District of Tain, Cromarty, and Invergordon).—Wheat, very variable returns; a few good fields, but average not over 28 to 30 bushels, and about 60 lbs. weight; about 3 bushels of seed. Barley, produce above average in quality, but of comparatively less weight than usual; average return about 38 bushels; about 3 bushels of seed. Oats, quantity above average, being about 36 bushels, but much below average in weight, very little exceeding 41 lbs. in good land; about 4 and 5 bushels sown. Harvest began about ten days later than usual. Hay crop generally light, but of fair

quality; average quantity about 26 cwt. Potatoes generally lifted well—in many cases 6 to 7 tons; very little disease. Turnips sadly deficient in quantity; many fields very bad with finger-and-toe; average of swedes about 12 tons, yellows about 8 tons. Crop brairded fairly well; very little second sowing. Injury by insects nothing unusual. Grass late in coming, but stood out fairly well. Stock generally very good, and free from disease. Clip of wool below average.

Sutherlandshire.—No wheat grown. Barley—This crop varied very much. On good and well-farmed land it was a heavy crop, but got laid before being cut, and does not thrash so well as last year; the average yield is about 34 bushels, and the weight generally 2 lbs. less than last year. Oats do not bulk so well as last year, unless under exceptional circumstances. There is, however, a fair quantity of straw, and it is of good quality where it was harvested before being knocked down by the gales that prevailed during harvest; the average yield is about 32 bushels; very little oats are marketed till spring, but I think the grain will be lighter than last year. Harvest about the usual time. There has been a decided want of clover, and the yield is generally one-third short of last year. Meadow hay similar to that of last year. Potatoes are not grown for sale to any extent; the crop has been large, and of best quality. The weight of the turnip crop is less than last year, and much below an average; a second sowing was necessary in many places, and there is a good deal of finger-and-toe. No injury from insects; turnips were said in some places to be injured by fly, but I think they were burned with frost. Pastures of average growth; rather more growth of ryegrass and other strong grasses and less clover. Stock did not thrive well on pasture, owing to the wetness of the season, but were free from disease. Wool weighed a good average, and the quality was sound and strong.

Caithness-shire.—No wheat grown. Bere generally grown instead of barley; the season generally was not favourable for the crops, owing to a want of seed and the early part too dry; bere will be 4 bushels under last year, and the weight 2 to 3 lbs. less; straw deficient; seed sown, 4 bushels. The oat crop is very irregular, but in most cases less by 4 bushels than last year; in some districts the weight of grain is 4 to 5 lbs. less, but on an average it may be stated at 3 lbs. less; quality of straw good, and well harvested, but short in quantity; one-fifth under last year; seed, 5 to 6 bushels. Harvest quite fourteen days after ordinary date; though late, good weather, and crop well secured. Hay crop deficient from dry weather in May; clover much as usual; weight not tested. Meadow hay, small extent grown; crop under average. Excellent crop of potatoes; considerably over average; disease very trifling, and late of appearing, but decay in the larger tubers; weight not tested, as the growth is mostly for home consumption. The braird of the turnip crop came away much as usual, and no second sowing was required; the crop varies a good deal in different districts; but, as a whole, the weight will be rather under last year. There was no special injury by insects; oats were in some cases damaged by grub, but not to a larger extent than in some former years. No injury by weeds. Pastures were not up to the average, being very thin at root. Live stock did not thrive so well as usual; season too cold, and pastures being thin at root. The county has been entirely free from disease. Wool an average in quantity and quality.

Orkney.—No wheat grown. Very little barley grown. Oats a light crop—about 32 bushels; average weight, 38 lbs.; straw, much less than last year; seed, 4 to 5 bushels. Harvest ten days later than usual. Hay crop rather below the average; quality good. Little meadow hay made.

Potato crop good; above an average, and of excellent quality; a little disease in gardens, but none in the field. Turnip crop, a third less than last year, and of inferior quality; brairded well, but did not come on well after; no second sowing. Turnip crop much injured by fly or caterpillar eating the leaves after second hoeing. Crops not much injured by weeds. Pastures under an average growth and quality. Stock throve indifferently, but were free from disease. Clip of wool an average.

Shetland (Island of Unst).—No wheat. No barley grown. Bere, light both in straw and grain; considerably under an average crop. Oats, a heavy crop after lea, but very light in straw after turnips and potatoes. This is more or less characteristic of the last three years. Harvest exceedingly late; began cutting on 28th September, being three weeks later than an average of the last fifteen years. Since the beginning of September, the weather has been exceedingly variable, with a great deal of rainfall and boisterous weather, so that harvesting was very difficult, and on some farms much grain was spoilt before it could be got into the stack-yard; grain is not turning out well; it is light, and in many cases partially heated. Rye-grass, quite an average, and clover plentiful; quality good. Meadow hay about the same as last year, but not being cut until the end of August, it was mostly all damaged in curing, and a great part absolutely lost in consequence of the continual rain. Potatoes a good crop; quite an average, and quite free from disease as far as known. Turnips an excellent crop, both as regards weight and quality; brairded well, but rather retarded with cold weather after getting rough blade; came away beautifully after thinning, and are still growing and green as in September. Weeds not troublesome with this crop. The winter of 1882–83 was a very open one, and pastures made great progress during the spring months; the summer was rather cold, but there was plenty of grass. Stock throve remarkably well, and were quite free from disease. Clip of wool good, and quite an average. It was the best winter and spring for sheep that we have had for many years.

Shetland (District of Lerwick).—No wheat. Bere, quantity about 30 bushels; quality equal to last year; seed about 2½ bushels. Oats, quantity about 20 bushels; quality not equal to last year; seed about 3 bushels. Harvest about a fortnight later than usual. Hay crop better than last year. Meadow hay rather better than last year. Potato crop rather better than last year; quantity about 6 tons; slightly diseased; disease commenced about 1st August. Weight of turnip crop about 15 tons; quality rather better than last year only one sowing required. No injury from insects; and none by weeds. Pastures were of average growth and quality, and stock did fairly well, and were free from disease. Clip of wool about an average in quantity and quality.

METEOROLOGY OF 1883.

The weather of 1883 was marked by a mild February, a very cold March, and a temperature under the average, though in no case greatly under the average each month continuously from April to October. As regards the rainfall, the amounts for the year were under the average of past years over the whole of the east coast and to some distance inland from Dornoch Firth to the Tweed, the greatest deficiency being in Mid and East Lothian,

where in some cases it was from a fourth to a third less than usual. In Sutherland and the Outer Hebrides also less rain fell; but elsewhere the rainfall exceeded the average, the greatest excess occurring in the south-west of the country and in central Perthshire.

JANUARY.—The mean temperature of Scotland, taken as a whole, was 1°·3 above the average of the month. The excess of temperature was greater over the whole of the eastern slope of the country from Fraserburgh southward, Upper Clydesdale, and Dumfriesshire, where in some places it closely approached 2°; and the least in Shetland, the Hebrides, and the extreme west and south-western countries, falling in some places to the average.

The rainfall was half an inch above the average, but its distribution over the country was unequal. It was under the average over a broad belt extending from East Lothian and Berwickshire on the east through Peeblesshire, Upper Clydesdale, and Middle Ayrshire to the west; over the greater portion of Aberdeenshire; and to the west and north of the Caledonian Canal,—the deficiency being fully a third in parts of East Lothian, Berwickshire, Skye, and Sutherland. Elsewhere the month was wetter than usual, particularly in central districts from Braemar to Lanark, and in Galloway.

FEBRUARY.—Temperature was 2° above the mean of the month, and the increase was equally divided between the days and the nights. The least excess was in the west and south-west, scarcely amounting in some cases to a degree; and the greatest excess in the eastern countries, and from Sutherland to Skye. This mild weather was due to the fact that northerly winds prevailed four days less, and south-westerly winds four days more than the average, the necessary result of the distribution of atmospheric pressure, which was nearly an inch lower at extreme western as compared with eastern stations.

The rainfall was fully an inch above the average, but it was most unequally distributed over the country. In Shetland, Orkney, the southern half of the Hebrides, parts of the counties of Ross, Argyll, Ayr, Galloway, Forfar, Kincardine, and Aberdeen, it was a half more than the average; whilst at Braemar, Pitlochrie, and Pinmore near Girvan, it was fully double, and at Aberfeldy thrice the average. On the other hand, it was under the average, in some cases very considerably so, over a broad belt extending from Paisley and Ayr in the west to St Andrews and St Abbs in the east; also in parts of Skye, the Lewis, Moray, Caithness and Sutherland, at Cape Wrath only half the average fell.

MARCH.—In this month, on the other hand, atmospheric pressure was considerably higher at western than at eastern

stations, from which it necessarily resulted that southerly winds fell much below the average and northerly winds predominated six days longer than usually takes place in March. Consequently, the mean temperature was nearly 4° below the average, colder even than March 1867, and colder than any March since 1855. To the north of the Caledonian Canal the deficiency was only from 2° to 3°, but in the most central districts, particularly in the south, temperature was in several places 5° below the mean of the month. The nights were relatively much colder than the days.

Over the whole of the west and a few isolated patches in the east the rainfall was under the average, in some cases only a fourth of the average, and in many only a half fell, and so extensive were these districts that the mean of the whole country was half an inch below the average. On the other hand, the greater prevalence of northerly and easterly winds was accompanied with an excessive rainfall. At Gordon Castle, Aberdeen, and Pitlochry nearly double the usual amount of rain was collected.

April.—The mean temperature was about the average, the nights being relatively colder than usual, but the distribution of the temperature over the country was very unequal. Thus over the east and to the north of the Grampians it was above the average, the excess being as much as 2° at some of the more northern and north-western stations; whereas over the whole of the central and south-western districts from Dalnaspidal to the Mull of Galloway, temperature was below the average, being a degree lower than the mean at Dalnaspidal, Rothesay, Pinmore, and Dumfries.

The distribution of the rainfall was intimately related to that of the temperature stated above. In the south-west, the rainfall was nearly in all cases above the average, the excess in no instance, however, reaching to a third above the average. Elsewhere it was under the average, the greatest deficiency being in parts of Aberdeenshire and in the north-western and northern districts. At Bressay only a fifth of the average rainfall of April was collected.

May.—The temperature was 1°·2 below the average, the deficiency being about equally partitioned between the days and nights. It was greatest in the south-west and west at Dumfries, Drumlanrig, Auchendrane, Greenock, Ardnamurchan, and the Lewis, the weather being 2° colder than the mean; whereas over the whole of the east coast the deficiency amounted either scarcely to or to little more than half a degree.

The rainfall was about a third of an inch below the average. Over the whole of the east slope of the country from Fraserburgh to the Tweed, the rainfall was under the average, in

several places the fall being only half the average; but in the north and north-west it was above the average, being double the average at Cape Wrath, and a half more than the mean at many places. In other districts the rainfall was distributed very sporadically in quantities varying from a third above to a third below the average.

JUNE.—The temperature was a degree and a half below the average, the larger part of this defect being occasioned by the colder nights. The deficiency was greatest in the south, where in several instances it was as much as 2°·5. As in May, the cold was least at all the extreme eastern stations from Shetland to Berwick.

The rainfall was a third of an inch under the average. To the north of a line drawn from Dundee through Aberfeldy, Airds, and Dunvegan, the rainfall was without exception under the average, in very many cases being even less than half the average. It was also below the average in the counties of Renfrew, Stirling, and the Lothians, the west of Fife, Selkirk, and large portions of the counties of Lanark, Dumfries, and Kirkcudbright, but in these districts the defect was not great. Elsewhere it exceeded the average, being fully a half more at Ochtertyre, Melrose, Wolfelee, and Eallabus.

JULY.—The temperature was 1°·5 under the average, the days being relatively much colder than the nights, which is explained by a greater amount of cloud and less sunshine than usual. The deficiency in temperature was greatest to the south of the Grampians, particularly in the extreme south-west of the country. From Skerryvore to Dumfries the deficiency was fully 2°, and it was there where the temperature of the days fell lowest as compared with the average. On the other hand, over the whole of Orkney and Shetland temperature was above the average, the excess in Shetland being 1°, and in these islands the temperature of the days exceeded the average.

The rainfall was 0·71 inch in excess of the mean, but its distribution was very unequal. Over the whole of western districts from the Solway to Ross-shire, and in Orkney and Shetland, it was greatly under the average, amounting in several places to scarcely a half of the average. In all other districts it was above the average, and many places were marked by an excessive rainfall in July. The following are the more noteworthy heavy falls stated in percentages above the means:—Fettercairn, 158; Cupar, Aberfeldy, and Dunrobin, 130; Tain, Inverness, Logie Coldstone, and Wolfelee, 100. Thus, during this important agricultural month, the northern islands enjoyed warm, dry weather; in the south-west it was cold and dry, but over the most important of the agricultural districts in the east the weather was unpropitiously cold and wet.

AUGUST.—The mean temperature was 0°·7 less than the average, the deficiency being greatest in western and north-western districts, where at several places it nearly amounted to 2°. At places in the extreme east, from Berwick to North Unst, the temperature was relatively higher, being indeed as high as the average in some districts.

The rainfall was 0·60 inch above the average. It was slightly under the mean in Shetland, parts of Caithness, Forfar, Perth, Fife, East Lothian, Berwick, Selkirk, and Roxburgh; but everywhere else it was above the average. Thus in Perthshire and the south-eastern counties, the weather of August was seasonably warm and drier than usual.

SEPTEMBER.—The mean temperature was nearly the average on the mean of the whole country, but it was very unequally distributed. In Shetland and Orkney, and over an extensive district marked off by a line from the Mull of Cantyre passing thence through Rothesay, Ochtertyre, St Andrews, Edinburgh, Wolfelee, and Girvan, temperature was above the average, the excess in no case amounting to a degree. In other districts it was below the average, but in no case was the deficiency as much as a degree.

The rainfall was about half an inch below the average. It was above the mean in Shetland, Orkney, between the Grampians and the Moray Firth, and the southern counties from Berwick to Wigtown, the excess being a half more than the average at Keith, Melrose, and Wolfelee. In other districts the rainfall was under the mean, and over large districts very considerably so. The greatest deficiency was in Wester Ross and Skye, where only half the usual falls were recorded.

OCTOBER.—The temperature was 0°·3 less than the average. The days were relatively warmer than the nights, owing to the less cloud and the large amount of sunshine. The temperatures differed little among the stations from their averages, but generally in the north-east and north it was above the average, but below it in the south and west.

The rainfall was the tenth of an inch below the average. In the east, from Berwick to Orkney, it was under the mean, the deficiency being greatest in the northern counties from Dundee to Inverness, where less than half the average amount was collected. Elsewhere the rainfall was distributed into irregular patches of excess and defect, but in only a few instances did the falls show departures from the means greater than a third.

NOVEMBER.—The temperature of November was the average of the month. It was above the mean in Shetland, and to the south of the Grampians, except at the south-westerly stations, where it was slightly below the average. Elsewhere temperature was a little under the mean. The greatest excess was in the

neighbourhood of Edinburgh, where it fully exceeded a degree; and the greatest deficiency in the north-west, where it nearly equalled a degree. This is now the third month when the temperature differed but little from the average over Scotland.

The rainfall was 0·84 inch above the average, which was wholly caused by the excessive rainfall of the west. To the east of a line drawn from Duncansbay Head near Dunrobin, Nairn, Braemar, Dundee, Edinburgh, and Milne-Graden, the rainfall was under the average, but to the west above it. In these two divisions the differences were most striking,—the deficiency in the counties of Berwick, East Lothian, Kincardine, Aberdeen, and Banff being a half to three-fourths the average; whilst, on the other hand, in the west from Cape Wrath to Galloway, the excess in most cases was at least a half more than, and in a few instances double, the average. In this month westerly winds prevailed seven days above the mean, and hence the heavy rains of the west, and the remarkably dry weather at the more easterly stations. This dry open weather enabled ploughing and other agricultural operations to be pushed well forward in the important agricultural districts in the east.

December.—In this month, temperature was 1°·5 above the average, the nights being relatively warmer that the days. The distribution of temperature was unequal in the different districts. In Skye and the region immediately surrounding, it was very slightly under the mean, but above it in all other districts. The greatest excess was in the south, but particularly in inland situations south of the Grampians, where at a number of places the weather was fully 2° warmer than usual. This was the mildest December since 1868. The mildness being due to the continued prevalence of strong westerly winds, accompanying the heavy storms that swept eastwards in tracks lying to the north of the islands; of these the storm of the 11th was very severe, ranking among the most destructive of recent years both on sea and land. In certain districts the destruction to growing timber was without precedent and it deserves to be noticed that the trees were blown down precisely in the same direction.

The rainfall was fully half an inch under the average. The manner of its distribution closely resembles that of November—the difference being that it was less heavy in the west, it did not penetrate so far to the east, and consequently over the whole of the eastern slopes, with Clydesdale and Galloway in addition, the weather was mild and dry; and as frost was nearly absent, it was eminently favourable for the vigorous prosecution of agricultural operations.

In the lower lying districts, from North Berwick to Greenock, harvest began generally about the usual time; but in other parts

of the country it was from one to three weeks later. The latest harvests are reported from the counties of Wigtown, Ayr, Argyll, Wester Ross, and the upper districts of Moray and Banff. In the districts of the Forth and Clyde, the earlier harvest is accounted for by the relatively higher temperature which prevailed there during the summer months, and particularly in August, September, and October.

Except in the counties of Dumbarton, Bute, and Ayr, the wheat crop was everywhere less than the average. The crop was damaged by the wet seedtime of the autumn of 1882, but especially by the cold parching weather of the spring of 1883. Barley was at least equal to the average in the same counties, and also in Islay, Perth, Moray, and Easter Ross. On the other hand, in Banff, Aberdeen, Fife, and the whole of the south-eastern counties, the crop was deficient.

Oats were above the average in the counties of Wigtown, Ayr, Renfrew, Dumbarton, Stirling, Fife, Perth, Forfar, and parts of Easter Ross. Elsewhere oats were under the average, and in many districts a good deal of damage was done by the heavy autumnal rains.

In eastern districts, from Aberdeenshire to the Tweed, with the exception of Perthshire, the potato crop was either an average one or less than the average; but everywhere else the crop was a fine one, much exceeding the average. It was a particularly fine crop in Wester Ross and Skye, being considered the best since 1846. The disease was trifling to the north of the Grampians, but in the southern half of the country it was greater. Such disease as did occur was almost altogether confined to the older varieties of the potato, and was chiefly felt in the river basins of the Tay, Forth, and Tweed, where in many places the loss equalled a third or even a half of the whole crop.

The turnip crop was a poor one, except in the south-western counties, and in Stirling, Dumbarton, Argyll, and Shetland. In many districts round the Firths of Forth, Tay, and Moray, the deficiency was from a third to a half of the average, owing to the dry parching weather of spring and early summer.

AGRICULTURAL STATISTICS OF SCOTLAND.—Returned upon 5th June 1883.—(*Extracted from the Government Returns.*)

TABLE No. 1.—Total Acreage under each kind of Crop, Bare Fallow, and Grass, in each County of Scotland.

Counties.	Total Acreage under Crops, Bare Fallow, and Grass.	Corn Crops.							Green Crops.							Clover, Sanfoin, and Grasses under Rotation.	Permanent Pasture (exclusive of Mountain Land).	Flax.	Bare Fallow or Uncropped Arable Land.
		Wheat.	Barley or Bere.	Oats.	Rye.	Beans.	Peas.	Total.	Potatoes.	Turnips.	Mangold.	Carrots.	Cabbage, Kohl-Rabi, and Rape.	Vetches, &c.	Total.				
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1. Aberdeen	606,746	50	14,154	198,918	423	187	252	213,984	7,891	92,620	3	92	62	2,799	103,467	260,289	28,002	2	1002
2. Argyle	122,841	6	2,135	20,483	721	334	17	23,696	6,589	5,459	56	35	97	34	12,270	21,412	62,875	—	2,588
3. Ayr	316,806	2,909	2,544	52,264	290	1,690	15	59,712	8,262	7,699	589	394	187	121	17,252	103,678	135,630	—	534
4. Banff	168,341	166	7,432	54,415	344	152	43	62,552	2,534	25,072	—	3	7	986	28,602	66,452	10,158	—	577
5. Berwick	194,898	4,657	19,934	36,507	87	1,971	272	63,428	2,791	30,109	168	9	294	845	34,216	59,052	37,995	—	207
6. Bute	25,018	67	276	5,160	59	141	6	5,709	1,199	1,389	8	1	9	95	2,701	6,646	9,877	—	85
7. Caithness	106,404	33	1,363	34,355	225	1	23	36,000	1,831	14,094	1	—	77	657	16,660	28,092	24,911	—	741
8. Clackmannan	15,836	519	909	3,456	—	810	—	5,694	388	1,003	15	—	5	78	1,489	4,028	4,342	—	283
9. Dumbarton	46,917	1,124	224	7,999	15	391	2	9,755	2,425	1,470	22	7	61	123	4,108	14,484	18,407	4	159
10. Dumfries	236,411	205	1,210	48,773	69	96	4	50,357	5,398	20,184	64	28	403	178	26,255	69,767	89,692	—	340
11. Edinburgh	136,541	4,621	9,866	22,042	19	351	55	36,954	6,957	12,084	15	34	533	1,260	20,883	32,019	46,323	—	362
12. Elgin	105,743	2,961	13,828	22,628	794	79	51	40,341	2,753	16,970	9	3	14	495	20,244	39,595	5,432	—	131
13. Fife	250,881	11,754	27,958	41,292	1,187	2,187	33	84,411	16,987	27,918	14	12	76	1,179	46,186	64,205	54,447	1	1,631
14. Forfar	254,026	8,321	31,047	52,922	447	803	46	93,586	18,134	33,761	13	53	97	998	53,056	81,462	25,688	—	234
15. Haddington	116,995	7,811	16,251	17,751	24	2,352	72	44,261	8,333	15,193	36	191	409	802	24,964	29,110	17,560	—	1,100
16. Inverness	130,459	33	8,527	31,503	859	34	92	41,048	8,586	11,239	4	1	34	156	20,020	27,748	40,472	—	1,171
17. Kincardine	120,879	376	11,343	31,690	128	682	28	44,247	3,657	18,029	—	24	11	527	22,248	46,381	7,758	1	244
18. Kinross	32,020	99	921	5,712	6	35	—	6,773	768	2,644	—	1	38	56	3,507	10,346	11,375	—	19
19. Kirkcudbright	180,597	124	360	31,708	13	140	—	32,345	2,615	14,658	38	50	427	67	17,855	72,677	57,479	—	241
20. Lanark	250,929	2,778	498	45,056	45	1,411	27	49,815	7,062	9,012	27	53	680	844	17,678	67,598	115,327	5	506
21. Linlithgow	59,241	1,407	4,068	10,859	34	838	2	17,208	2,288	4,019	7	6	40	312	6,672	14,381	20,427	8	545
22. Nairn	26,419	35	3,099	5,897	196	—	7	9,234	572	4,133	—	—	—	45	4,750	10,375	2,043	—	17
23. Orkney	112,148	—	5,641	32,781	1	2	34	38,459	3,104	14,387	—	—	56	305	17,852	32,051	22,755	—	1,031
24. Shetland	58,393	—	2,478	8,050	—	—	—	10,528	3,357	943	—	—	211	—	4,511	780	41,628	—	946
25. Peebles	42,433	—	962	8,797	—	2	71	9,832	620	4,679	—	—	299	118	5,716	12,078	14,763	—	44
26. Perth	344,240	6,238	22,770	70,424	435	3,087	96	103,050	18,611	31,059	32	18	135	944	50,799	100,631	87,064	—	2,696
27. Renfrew	95,070	2,410	216	14,176	76	471	33	17,382	4,455	2,193	60	31	155	143	7,037	21,770	48,460	—	421
28. Ross & Cromarty	134,298	3,078	12,640	31,186	877	12	85	47,878	9,764	16,653	30	1	15	831	27,294	40,070	18,378	—	678
29. Roxburgh	181,856	1,803	14,361	32,713	99	821	177	49,974	2,140	25,323	34	7	379	562	28,445	57,954	45,281	—	202
30. Selkirk	23,294	4	452	4,389	—	—	12	4,857	195	2,638	—	—	382	47	3,262	7,340	7,720	—	115
31. Stirling	114,698	2,755	4,366	19,811	88	3,414	6	30,440	3,927	4,577	10	12	86	441	9,053	25,826	47,735	88	1,556
32. Sutherland	31,787	49	2,218	7,817	214	11	28	10,337	2,143	3,202	—	1	36	56	5,438	7,491	8,384	—	137
33. Wigtown	146,867	1,779	1,497	34,415	118	475	1	38,285	2,458	15,894	275	176	114	170	19,087	66,216	22,900	—	379
Total,	4,790,032	68,172	245,548	1,045,949	7,893	22,980	1,590	1,392,132	168,794	490,307	1,530	1,243	5,429	16,274	683,577	1,502,004	1,191,288	109	20,922

TABLE No. 2.—Number of Horses, Cattle, Sheep, and Pigs in each County of Scotland.

Counties.	Horses (including Ponies).			Cattle.				Sheep.			Pigs.
	Used solely for Agriculture, &c.	Kept solely for Breeding.	Total.	Cows and Heifers in Milk or in Calf.	Other Cattle. 2 years of Age and above.	Other Cattle. Under 2 Years of Age.	Total.	1 Year Old and above.	Under 1 Year.	Total.	
1. Aberdeen	20,720	4,798	25,518	41,382	39,421	74,182	154,985	98,171	35,892	134,063	10,848
2. Argyle	4,338	2,613	6,951	22,728	14,645	23,645	61,018	717,408	291,271	1,008,679	4,968
3. Ayr	6,446	2,200	8,646	44,632	14,487	33,021	92,140	214,770	129,606	344,376	13,505
4. Banff	6,392	1,585	7,977	12,943	6,748	22,766	42,457	30,494	18,537	49,031	4,180
5. Berwick	4,171	1,231	5,402	3,172	4,522	6,282	13,976	159,338	119,640	278,978	4,862
6. Bute	837	268	1,105	3,347	1,528	2,924	7,799	26,164	14,358	40,522	747
7. Caithness	4,117	985	5,102	6,827	2,586	10,048	19,461	62,548	32,520	95,068	1,766
8. Clackmannan	510	161	671	1,382	834	1,327	3,543	6,278	3,251	9,529	2,063
9. Dumbarton	1,240	545	1,785	7,072	1,847	3,991	12,910	47,106	23,459	70,865	824
10. Dumfries	5,395	1,690	7,085	17,151	13,347	22,491	52,989	310,794	181,634	492,428	13,014
11. Edinburgh	3,390	590	3,980	10,579	3,482	3,579	17,640	94,223	63,809	158,032	6,725
12. Elgin	4,073	957	5,030	6,817	3,851	12,569	23,237	35,629	18,648	54,277	4,189
13. Fife	7,839	2,214	10,053	9,158	14,665	15,519	39,342	51,949	29,707	81,656	7,299
14. Forfar	8,322	1,624	9,946	11,710	16,074	16,530	44,314	86,355	38,915	125,270	7,244
15. Haddington	3,223	446	3,669	1,589	4,566	2,092	8,247	72,043	47,350	119,393	2,758
16. Inverness	6,849	2,095	8,944	20,456	8,192	21,208	49,856	493,138	196,609	689,747	3,957
17. Kincardine	3,927	825	4,752	6,669	5,837	11,049	23,555	19,921	7,957	27,878	3,000
18. Kinross	653	320	973	1,000	1,731	2,828	5,559	18,838	11,566	30,404	650
19. Kirkcudbright	3,840	1,555	5,395	12,623	12,839	16,135	41,597	247,550	121,136	368,686	7,417
20. Lanark	5,620	1,731	7,351	35,539	9,542	21,827	66,908	130,615	76,321	206,936	8,088
21. Linlithgow	1,571	498	2,069	3,743	3,130	3,912	10,785	12,296	4,780	17,076	2,376
22. Nairn	1,006	213	1,219	1,751	683	3,242	5,676	11,958	4,841	16,799	926
23. Orkney	4,884	1,208	6,092	9,405	3,621	12,598	25,624	17,387	14,211	31,548	4,745
24. Shetland	908	4,397	5,305	8,132	6,314	6,899	21,345	50,171	30,992	81,163	3,788
25. Peebles	912	230	1,142	1,946	1,096	2,622	5,664	113,455	78,667	192,122	919
26. Perth	10,524	3,127	13,651	18,755	22,127	32,215	73,097	481,512	215,128	696,640	9,589
27. Renfrew	2,236	863	3,099	15,760	3,285	6,810	25,855	19,825	11,565	31,390	1,588
28. Ross and Cromarty	5,724	1,517	7,241	17,521	8,045	16,386	41,952	228,012	96,988	325,000	6,937
29. Roxburgh	3,759	729	4,488	4,842	4,979	7,044	16,865	281,052	207,767	488,819	4,229
30. Selkirk	486	74	560	914	634	917	2,465	95,832	68,451	164,283	484
31. Stirling	3,157	1,528	4,685	10,109	8,283	10,939	29,331	72,208	41,249	113,457	2,243
32. Sutherland	2,191	534	2,725	5,538	2,933	4,348	12,819	165,316	54,374	219,690	1,317
33. Wigtown	4,100	1,487	5,587	19,990	6,488	14,828	41,306	80,461	48,095	128,556	9,353
Total,	143,360	44,838	188,198	395,182	252,362	446,773	1,094,317	4,553,067	2,339,294	6,892,361	156,598

TABLE No. 3.—Quantities and Values of the Imports of Live Cattle, Sheep, and Swine, 1878 to 1882.

	QUANTITIES.					VALUES.				
	1878.	1879.	1880.	1881.	1882.	1878.	1879.	1880.	1881.	1882.
	No.	No.	No.	No.	No.	£	£	£	£	£
Live Cattle,	253,462	247,768	389,724	319,374	343,699	5,080,702	4,639,431	7,793,960	6,251,557	6,655,590
Live Sheep,	892,125	944,888	941,121	935,144	1,124,391	2,171,904	2,252,824	2,266,436	2,191,762	2,558,827
Live Swine, including Sucking Pigs,	55,911	52,366	51,191	24,283	15,670	200,703	183,131	178,899	81,917	57,539
Total,	1,201,498	1,245,022	1,382,036	1,278,801	1,483,760	7,453,309	7,075,386	10,239,295	8,525,256	9,271,956

TABLE No. 4.—Quantities and Values of the Imports of Beef and Pork (Salted), Bacon and Hams, &c., 1878 to 1882.

	QUANTITIES.					VALUES.				
	1878.	1879.	1880.	1881.	1882.	1878.	1879.	1880.	1881.	1882.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	£	£	£	£	£
Meat—										
Beef, salted,	220,816	242,977	290,564	251,304	228,429	420,077	418,854	535,213	487,650	493,997
Beef, fresh or slightly salted,	508,307	569,260	727,392	817,295	463,954	1,346,285	1,518,574	1,889,730	2,175,876	1,291,165
Unenumerated, salted or fresh,	145,981	153,284	149,010	178,256	201,319	428,064	440,726	429,073	516,551	674,976
,, preserved other than salted,	439,900	567,877	655,800	575,482	560,581	1,315,701	1,690,099	1,905,717	1,637,545	1,693,520
Pork, salted and fresh,	389,439	441,209	409,267	381,526	290,587	659,462	691,362	684,192	681,551	583,797
Bacon and Hams,	4,295,151	4,917,631	5,334,648	4,627,484	2,904,400	8,669,310	8,880,223	10,985,642	10,729,945	7,772,063
Total,	5,999,594	6,892,238	7,566,681	6,831,347	4,649,270	12,838,899	13,639,838	16,429,567	16,229,118	12,509,518
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	£	£	£	£	£
Fish,	995,933	1,160,140	1,343,434	1,530,219	1,239,217	1,541,830	1,652,957	1,666,710	2,332,605	2,079,181
Poultry and Game (see Value),	. .	. .	. .	. .	. .	403,024	432,289	421,645	457,553	501,008
Butter,	1,796,517	1,789,721	2,326,305	2,047,341	2,169,717	9,954,053	10,379,451	12,141,034	10,866,151	11,350,909
Cheese,	1,968,859	2,045,399	1,775,997	1,840,090	1,694,623	4,946,686	3,824,017	5,091,514	5,245,115	4,749,870
Lard,	908,605	840,819	927,512	854,322	667,153	1,787,874	1,420,881	1,852,160	2,197,166	1,866,360
Eggs, Number	783,714,720	766,707,840	747,408,600	756,719,160	811,922,400	2,511,096	2,295,720	2,235,451	2,322,390	2,385,263
Total,	. .	. .	. .	. .	. .	21,144,563	20,005,315	23,408,514	23,420,980	22,932,591

TABLE No. 5.—Quantities and Values of the Imports of Wheat and Wheat Flour, 1878 to 1882.

	Quantities.					Values.				
	1878.	1879.	1880.	1881.	1882.	1878.	1879.	1880.	1881.	1882.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	£	£	£	£	£
Wheat,	49,906,484	59,591,795	55,261,924	57,147,933	64,240,749	27,433,444	31,468,171	30,621,711	31,531,535	34,259,126
Wheat Flour,	7,828,079	10,728,252	10,558,312	11,357,381	13,057,403	6,784,197	8,501,949	8,706,109	9,205,219	10,662,439
Total,	57,734,563	70,320,047	65,820,236	68,505,314	77,298,152	34,217,641	39,970,120	39,327,820	40,736,754	44,921,565

TABLE No. 6.—Quantities and Values of the Imports of Barley, Oats, Rye, Meal, and Malt, 1878 to 1882.

	Quantities.					Values.				
	1878.	1879.	1880.	1881.	1882.	1878.	1879.	1880.	1881.	1882.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	£	£	£	£	£
Barley,	14,156,919	11,546,314	11,705,290	9,805,944	15,540,112	5,542,503	4,804,469	5,011,159	4,067,706	5,529,687
Oats,	12,774,420	13,471,660	13,826,732	10,324,119	13,638,457	4,557,665	4,496,927	4,934,468	3,776,862	4,601,176
Indian Corn,	41,673,906	36,148,379	37,224,733	33,480,846	18,275,731	12,595,402	9,818,601	11,163,080	10,408,302	6,530,634
Peas and Beans,	3,696,300	4,248,667	4,723,384	4,065,720	4,205,732	1,468,146	1,642,277	1,923,498	1,626,168	1,648,986
Rye,	342,395	207,253	126,112	169,213	305,939	125,291	91,358	51,768	79,014	118,451
Buckwheat,	45,813	42,753	31,757	45,032	88,960	16,067	14,823	12,858	16,250	29,514
Total,	72,689,753	65,725,026	67,638,008	57,890,874	52,054 931	24,305,074	20,868,455	23,094,831	19,974,302	18,458,448
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	£	£	£	£	£
Barley Meal,	485	2,417	1,611	426	—	166	811	844	200	—
Oatmeal,	762,088	645,928	625,415	177,897	117,570	485,888	391,002	378,370	104,256	76,509
Indian Meal,	41,747	37,080	55,374	25,137	16,514	32,276	25,585	36,842	24,007	22,310
Rye Meal,	56,322	8,345	9,250	7,732		20,986	3,122	4,326	5,476	
Pea Meal and Bean Meal,	995	696	118	830	181,829	442	251	61	396	60 483
Buckwheat Meal,	16	92	68	9		18	92	69	9	
Meal unenumerated,	5,711	4,112	22,450	27,334		2,384	1,999	12,106	11,278	
Total,	867,364	698,670	714,286	239,365	315,913	542,160	422,862	432,618	145,712	159,302

TABLE No. 7.—Average Prices of Various kinds of Animals, Dead Meat, and Provisions, 1878 to 1882.

Kinds of Animals, Dead Meat, &c.	1878.	1879.	1880.	1881.	1882.
Animals—Oxen and Bulls from all countries, . . . each	£22 12 2	£21 17 6	£22 0 11	£21 15 2	£21 4 11
,, Sheep, including lambs, from all countries, . . ,,	2 8 8	2 7 8	2 8 2	2 6 11	2 5 6
Bacon—From all countries, ... per cwt.	1 18 7	1 14 4	2 0 0	2 5 10	2 13 0
Hams—From all countries, ... ,,	2 8 1	2 3 9	2 6 6	2 9 0	2 15 7
Beef, salted—From all countries, ... ,,	1 18 1	1 14 6	1 16 10	1 18 10	2 3 3
,, Admiralty prices {American, . . . ,,	—	—	2 0 $2\frac{3}{4}$	2 7 $10\frac{1}{2}$	2 9 1
{Deptford, . . . ,,	—	—	3 0 $1\frac{1}{4}$	—	—
Pork, salted—From all countries, ... ,,	1 13 1	1 19 11	1 12 7	1 14 9	1 19 5
,, Admiralty prices, ... ,,	2 15 $5\frac{1}{2}$	—	2 19 $3\frac{3}{4}$	3 0 1	3 2 $8\frac{1}{2}$
Butter—From all countries, ... ,,	5 10 10	5 1 6	5 4 5	5 6 2	5 4 8
Cheese—From all countries, ... ,,	2 10 3	2 2 9	2 17 4	2 17 0	2 16 1
Potatoes—From all countries, ... ,,	0 5 5	0 5 9	0 5 10	0 5 5	0 6 8
Eggs—From all countries, ... per 120	0 7 8	0 7 2	0 7 2	0 7 4	0 7 1
Lard—From all countries, ... per cwt.	1 19 4	1 13 10	1 19 11	2 11 5	2 15 11
Milk—Bethlehem Hospital prices, ... per gallon	0 1 3	0 1 3	0 1 0	0 $0\frac{1}{4}$	0 1 0

TABLE No. 8.—Return of the Average Prices of Wool in each of the Years from 1863 to 1882.

Years.	Australian.	South African.	English Fleeces.	Years.	Australian.	South African.	English Fleeces.
	Per lb.	Per lb.	Per lb.		Per lb.	Per lb.	Per lb.
	s. d.	s. d.	s. d. s. d.		s. d.	s. d.	s. d.
1863 . . .	1 $6\frac{3}{4}$	1 $2\frac{3}{4}$	—	1873 . . .	1 $3\frac{1}{2}$	1 $4\frac{1}{2}$	1 11
1864 . . .	1 $9\frac{3}{8}$	1 $5\frac{1}{4}$	—	1874 . . .	1 $2\frac{5}{8}$	1 $4\frac{5}{8}$	—
1865 . . .	1 $7\frac{3}{8}$	1 $3\frac{1}{16}$	2 0 to 2 1	1875 . . .	1 $4\frac{1}{4}$	1 $4\frac{1}{4}$	1 $6\frac{1}{2}$
1866 . . .	1 $8\frac{3}{16}$	1 $5\frac{1}{8}$	1 9 ,, 1 10	1876 . . .	1 $3\frac{1}{2}$	1 $3\frac{3}{4}$	1 $5\frac{1}{2}$
1867 . . .	1 $7\frac{1}{2}$	1 $2\frac{3}{4}$	1 7	1877 . . .	1 3	1 $3\frac{3}{4}$	1 $4\frac{1}{2}$
1868 . . .	1 $3\frac{15}{16}$	1 $2\frac{9}{16}$	—	1878 . . .	1 $2\frac{1}{2}$	1 $3\frac{1}{4}$	1 $3\frac{1}{2}$
1869 . . .	1 $2\frac{15}{16}$	1 $2\frac{3}{4}$	1 $3\frac{1}{2}$	1879 . . .	1 $2\frac{1}{2}$	1 $2\frac{1}{2}$	1 $0\frac{1}{4}$
1870 . . .	1 $3\frac{1}{4}$	1 $3\frac{1}{4}$	—	1880 . . .	1 $2\frac{3}{4}$	1 $3\frac{1}{4}$	1 $2\frac{1}{2}$
1871 . . .	1 $2\frac{1}{4}$	1 1	1 1	1881 . . .	1 $2\frac{1}{2}$	1 3	1 $3\frac{1}{2}$
1872 . . .	1 3	1 $4\frac{1}{4}$	—	1882 . . .	1 $0\frac{1}{2}$	1 $2\frac{1}{4}$	1 2

TABLE No. 9.—Average Prices (per Imperial Quarter) of Home-grown Wheat, Barley, and Oats in the Weekly Market of Edinburgh, for the Years 1879, 1880, 1881, 1882, and 1883.

Weekly Market day, Wednesday.		WHEAT.										BARLEY.										OATS.									
		1879.		1880.		1881.		1882.		1883.		1879.		1880.		1881.		1882.		1883.		1879.		1880.		1881.		1882.		1883.	
		s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
January	1	39	2	43	1	44	10	33	0	35	11	33	10	33	3	33	0	25	7	28	11	21	6	26	7	23	0	21	8	23	11
	2	38	0	46	11	42	8	39	8	38	0	33	3	33	6	34	4	26	8	29	0	21	8	26	5	23	0	22	4	23	2
	3	40	4	39	2	46	3	33	0	36	8	32	9	32	5	33	6	25	5	30	11	22	0	26	6	23	6	22	3	23	1
	4	38	3	38	6	44	4	35	1	35	5	34	2	31	6	34	0	24	11	30	6	22	1	26	10	23	4	22	6	23	10
	5	.	.	.	.	.	.	.	.	37	0	.	.	.	.	.	.	.	.	30	1	.	.	.	.	.	.	.	.	23	9
February	1	38	0	37	1	43	5	30	8	37	7	34	3	31	8	34	8	24	6	30	3	21	10	26	2	23	2	22	6	23	9
	2	37	6	36	1	41	9	37	6	39	4	34	3	33	10	33	4	23	6	31	2	21	8	25	11	23	4	22	6	23	10
	3	38	6	38	3	43	0	34	0	37	11	34	10	33	1	32	6	24	9	30	2	22	1	27	9	23	1	22	8	24	8
	4	38	6	41	7	39	3	37	7	40	1	35	8	30	6	33	4	23	0	30	2	22	1	27	8	24	0	22	10	24	8
March	1	38	4	38	9	41	2	40	3	41	0	35	10	30	0	34	3	22	1	28	4	23	1	28	6	23	6	23	0	26	2
	2	39	9	35	9	40	0	33	5	39	8	38	4	30	3	33	11	23	9	31	9	22	8	27	7	24	0	23	5	25	7
	3	40	0	41	1	47	1	37	2	38	1	37	5	29	11	36	1	23	3	29	7	22	11	29	1	24	1	24	4	25	3
	4	42	0	44	10	43	9	35	8	38	6	37	7	32	5	36	2	23	3	32	8	23	7	28	10	23	8	24	11	26	0
	5	.	.	51	11	42	8	37	9	.	.	.	.	31	6	36	4	24	5	.	.	.	.	29	0	23	10	24	0	.	.
April	1	42	5	42	4	41	11	38	3	39	6	38	4	33	2	36	3	25	0	30	7	24	4	30	1	24	8	23	3	26	5
	2	42	0	44	11	48	3	37	9	.	.	36	8	31	11	35	0	23	8	32	2	23	5	28	10	24	10	25	1	26	2
	3	41	10	39	6	44	11	39	6	41	7	37	4	28	9	35	0	26	10	31	6	23	2	29	4	24	2	25	6	26	7
	4	42	2	42	6	46	0	37	6	.	.	38	5	30	8	33	7	24	5	32	5	23	8	29	6	25	0	26	0	25	6
	5	41	6	.	.	.	.	.	.	.	.	37	0	.	.	.	.	.	.	.	.	24	6	.	.	.	.	.	.	.	.
May	1	42	1	42	3	44	5	35	11	41	1	36	6	29	5	33	5	23	11	33	8	24	2	28	6	25	7	25	8	26	10
	2	42	11	44	0	49	1	38	7	41	2	34	4	31	8	34	5	24	6	32	0	24	8	29	6	25	2	25	8	27	1
	3	41	9	40	11	45	0	39	0	42	4	34	7	26	11	34	8	22	10	32	2	23	8	29	3	24	9	25	7	27	1
	4	42	10	43	0	44	2	39	1	42	0	36	0	29	5	32	0	23	5	29	0	24	2	29	7	24	9	26	6	27	0
	5	.	.	.	.	.	.	37	6	41	7	.	.	.	.	.	.	24	1	30	11	.	.	.	.	.	.	26	6	26	9
June	1	41	6	44	1	46	0	37	7	43	6	33	4	26	7	34	6	25	6	31	10	24	3	29	4	24	2	26	11	27	6
	2	41	11	43	6	47	7	39	1	43	8	37	3	27	11	34	0	.	.	29	10	24	2	29	7	24	7	26	11	27	11
	3	41	5	41	8	47	6	38	5	42	6	37	0	27	1	35	2	26	3	32	1	24	7	29	8	25	6	27	5	28	3
	4	41	2	39	4	48	1	38	0	41	9	36	10	28	8	33	9	24	0	29	9	25	2	29	4	25	2	26	10	28	2
	5	.	.	38	6	47	11	.	.	.	.	.	.	26	11	.	.	.	.	.	.	.	.	30	5	24	7	.	.	.	.
July	1	43	5	38	6	44	7	39	10	39	0	35	8	25	2	29	9	24	9	31	8	24	10	29	6	24	11	26	1	28	8
	2	43	9	43	7	46	8	43	1	38	7	36	9	24	6	33	2	26	6	29	2	25	8	28	11	24	2	27	1	27	11
	3	44	8	43	4	47	4	43	9	39	9	35	2	23	10	33	4	25	10	29	11	25	11	31	2	23	5	26	10	28	4
	4	47	5	42	0	48	3	43	10	42	7	34	4	27	10	.	.	.	.	30	0	26	6	29	8	24	2	27	9	28	0
	5	48	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	27	8	.	.	.	.	.	.	.	.
August	1	48	0	39	4	49	0	43	0	.	.	38	2	26	8	27	0	.	.	30	0	28	2	29	11	24	7	28	5	28	11
	2	46	11	33	10	49	2	39	10	43	9	31	8	26	2	30	0	26	3	.	.	28	4	30	0	24	9	28	0	29	2
	3	45	10	40	8	50	3	33	0	38	8	.	.	24	6	31	3	25	0	.	.	29	1	29	5	25	1	27	6	28	10
	4	46	8	40	5	56	5	33	6	42	11	35	0	27	5	34	4	28	6	.	.	29	6	27	6	26	7	28	4	28	9
	5	.	.	.	.	52	10	37	0	44	7	.	.	.	.	.	.	28	6	34	0	.	.	.	.	26	8	27	8	29	8
September	1	44	11	36	0	58	6	32	2	39	5	40	3	24	6	34	0	29	11	34	11	29	6	23	7	26	7	28	0	28	8
	2	45	11	31	2	54	8	37	6	42	7	.	.	32	0	34	0	36	2	.	.	29	10	24	0	26	0	25	11	26	4
	3	46	9	32	3	57	6	37	4	43	0	.	.	33	7	30	8	35	0	31	0	29	4	24	5	25	11	25	5	25	11
	4	50	8	38	5	57	3	34	10	42	2	36	4	32	4	34	2	32	5	29	3	28	1	24	4	26	7	23	11	25	10
	5	.	.	36	6	.	.	.	.	.	.	.	.	33	4	.	.	.	.	.	.	.	.	23	8	.	.	.	.	.	.
October	1	52	9	39	8	58	6	38	6	43	6	34	1	34	2	33	6	30	8	29	9	25	8	23	8	25	1	23	6	27	4
	2	54	0	43	5	57	3	35	4	40	11	37	2	36	1	27	8	29	10	29	3	28	4	24	2	25	2	22	9	25	7
	3	55	9	42	4	47	3	40	3	38	2	34	10	35	2	26	8	27	5	28	10	26	8	23	11	25	0	22	6	24	5
	4	59	0	40	7	45	4	35	10	37	5	35	10	35	0	27	9	28	5	29	1	26	10	23	6	23	7	23	0	24	6
	5	56	7	.	.	.	.	.	.	39	11	32	5	.	.	.	.	.	.	29	6	26	4	.	.	.	.	.	.	24	11
November	1	53	6	42	0	37	5	38	5	37	2	31	3	33	7	25	10	29	0	29	8	24	9	23	4	22	7	22	11	24	10
	2	43	11	46	0	50	9	37	10	43	7	30	6	32	1	26	0	30	10	29	1	25	2	23	2	22	2	23	3	24	1
	3	53	7	44	2	44	0	35	10	40	0	30	3	33	1	24	7	30	9	29	7	25	0	24	7	21	0	24	0	23	1
	4	47	6	46	9	46	2	39	2	37	5	29	7	34	7	24	0	29	5	29	5	23	5	24	9	21	1	23	10	23	6
	5	.	.	.	.	39	5	.	.	.	.	.	.	.	.	25	2	.	.	.	.	.	.	.	.	21	4	.	.	.	.
December	1	42	0	43	0	35	9	37	3	42	0	30	8	34	4	24	6	29	6	28	0	24	5	24	6	21	8	24	7	23	6
	2	45	6	46	4	42	10	36	7	39	4	34	1	33	3	24	9	30	7	27	5	23	11	23	9	22	3	24	2	22	9
	3	49	10	37	4	37	7	36	3	34	8	33	3	32	6	25	2	31	5	28	10	24	1	23	6	21	1	23	10	23	5
	4	47	5	42	10	31	11	36	0	30	0	33	8	32	7	24	5	30	1	28	11	25	8	23	5	22	5	23	6	23	2
	5	49	8	46	0	.	.	.	.	.	.	32	2	33	7	.	.	.	.	.	.	26	9	23	3	.	.	.	.	.	.

CHEMICAL DEPARTMENT.

EXPERIMENTAL STATIONS.

By Dr A. P. Aitken, Chemist to the Society.

TURNIP CROP 1882.

With the turnip crop of 1882 began the second rotation of the experiments at the Society's stations. The former turnip crop of 1878 suffered so severely from the inclemency of the winter that a large part of the experiments was rendered quite untrustworthy. The most of the crop had to remain on the field until the middle of March, and by that time the alternations of frost and thaw had ruined a large part of the crop on both stations.

The analysis of the crop, owing to the want of a laboratory specially adapted for agricultural research, was performed upon a very small scale, and it was pointed out at the time that the results obtained could only be considered as approximations to truth, and their chief use lay in giving indications that would require to be verified and controlled by future investigations.

It was found that the analysis of a turnip crop, in order to be reliable, would require to be done on a very extensive scale, and with the help of apparatus and laboratory arrangements specially adapted for the purpose.

To meet the requirements of the crop of 1882, a laboratory was provided, and fitted up with special apparatus for the analysis of field crops.

The season of 1882 was on the whole a favourable one for the turnip crop in the Lowlands, and nothing occurred to interfere with the success of the experiments at the stations. The plan of the experiments was the same as in 1878, the main object being to determine the agricultural values of the various forms of light manure in common use, and to obtain information which might guide farmers in selecting the materials best suited for their purposes. When a farmer has discovered the kind of manure that is most economical to apply, that is a matter of great importance to him; but there are other things which he wishes to know. He must know the quantity per acre which it is most profitable to employ, and he also requires to know what is the condition of the manure most favourable for application. The experiments have been modified so as to yield information on these points. There is another matter of importance in the use of light manures regarding which information is wanted, viz., the best time in which to apply the various kinds of manure. In order to obtain some information on this point, the plan of experiments was modified in 1882 without interfering

with the general scope of the inquiry. Each plot was divided into two parts,—to the one part the manures were applied in the middle of January, and to the other part the same manures were applied in the middle of May, making a difference of five months in the time of application. The only substances which were not so applied were the nitrate of soda and the sulphate of ammonia. These substances are so rapid in their action that it was thought prudent, even for experimental purposes, to postpone their application till the crop was there to receive them; accordingly they were applied to the young plants about a month after sowing. It may be well to remark here that this division of the stations into an early and a late manured half enormously increased the labour in carrying out the experiments, and called for greatly increased care and watchfulness on the part of the farm stewards who had the superintendence of the work. The management of an experimental station divided into about 80 plots of an eighth of an acre each is a laborious work, and is especially irksome when it is added on to the ordinary work of a considerable farm. The labour in connection with the turnip crop of 1882 was increased on account of the wetness of the winter, which prevented the crop from being carted from the field at the time of lifting. The crop of each plot had to be stored upon its own ground, and it was so late before it could be carried in and weighed that the results were not forward in time for publication in the last volume of the *Transactions*.

Even if the results had been obtained it would not have been prudent to publish them, for the weight per acre of a turnip crop gives often a very fallacious idea of the amount of actual food per acre contained in it. This may be said of all field crops, but of none more truly than of turnips, which at best contain only about 12 per cent. of solid matter, and may contain little more than half that quantity. Before any idea of the relative value of turnip crops can be obtained, they must first be analysed, not only to know what proportion of the entire crop is solid matter, but to know how much of that solid matter is of a nutritive kind. This has been done for the crops at the Society's stations for 1882, and the work has taken fifteen months to perform. As the value of an analysis of a crop of roots depends much upon the scale on which it is carried out and the method of sampling, a few words on that subject will be necessary before laying the details before the reader. The selection of the roots from the field was performed by five persons, who were stationed at regular intervals along the outside drill of each half-plot, thus dividing the half-plot into five equal sections. They walked across the plot, and each selected eight turnips which in his opinion most fairly represented the average character of the

roots in his section. These were deposited at the outside drill, and the next plot was entered and sampled in the same manner. The whole breadth of the station was thus traversed four times, and forty average turnips were selected from each half-plot. These were collected and put into two bags, twenty in each bag, carefully labelled, and sent to the laboratory. By this means each half-plot was sampled in duplicate, and the duplicates were kept distinct until the dry matter was estimated. Nearly 3000 turnips from each station were required to form the samples for the estimation of the dry matter, and the manipulation of these was a very laborious work. The following was the method employed. Each batch of twenty was washed and brushed to remove any adhering earthy matter, and thereafter dried with towels and weighed. Each turnip was then brought under the stroke of a large knife worked as a lever, and cut in two from above downwards ; one half was kept, and the other thrown away. Another stroke of the knife divided the half turnip in two in a similar direction, and one half was thrown away ; of the remaining quarter a slice was taken in the same direction, representing from a half to a third of its bulk. So that of each turnip there was selected for analysis a segment from above downwards, and from the core to the skin which represented from one-eighth to one-twelfth of the bulk of the bulb.

These segments were each laid on its side, and made to pass under the lever-knife when in rapid motion, and furnished with a guard near the hilt to prevent the blade from descending nearer than about about an eighth of an inch from the table. Each segment was thus split into twenty or more laminæ attached to each other like the teeth of a comb. Each batch of laminated segments was immediately weighed, and put into a large drying chamber on a tray. After a few days in the drying chamber these were sufficiently dry to be put into paper bags, and set aside to make room for others. The preparing and securing of the partially dried samples of each station occupied about a month. Thereafter the bagged samples were put again into the drying chamber and kept at a temperature of about 80° C. until they were nearly dry, and were so hard as to permit of their being ground to a fine powder. Each sample was then weighed, and thereupon ground in a coffee-mill, and secured in a bottle with an air-tight stopper.

The small amount of residual moisture was thereafter estimated, and as soon as this stage was reached the duplicate samples of each half-plot were mixed together, and from the combined powder the various constituents of the crops on each half-plot were determined.

It might seem from this description that the sampling and drying of the samples of a turnip crop was a comparatively easy

matter, while in reality it is a complex and laborious operation, requiring several months for its accomplishment.

It 1878 the crop at Harelaw was swedes, and that at Pumpherston was turnips. In 1882 turnips (Fosterton hybrid) were grown at both stations. The land was ploughed and harrowed early in January, and remained in that state during the winter. The object of harrowing the land at that early date was to enable the manure applied in January to be evenly spread over the soil. The half which was to be manured in May might have been left unharrowed, but it was necessary that the land should be all treated alike, so that nothing might interfere with the manurial part of the experiments. The manures were applied at Harelaw in the third week of January and in the third week of May, at Pumpherston in the fourth week of January and in the second week of June. The manures which were too dry were mixed with damp earth, and any blowing of manure was further guarded against by the use of screens in the usual manner. The land was drilled up, and sown a few days after the second manuring. The crop brairded well at both stations, and the nitrate of soda was not applied till after all the plots were singled. The latter part of the season was wet, and favourable to the action of insoluble manures. The turnips were sampled at both stations early in November, to avoid the risk of interference from frost or snow.

Before giving the details of the crop, it is necessary to refer the reader to the scheme of the experiments contained on page 420, where it will be seen that there are chiefly three kinds of manures under investigation, viz., phosphatic, nitrogenous, and potassic manures. Most of the plots receive all three manure constituents, but from some of them one or two constituents are omitted.

The important thing to remember regarding these constituents is that they are applied in definite quantity to all the plots which receive them. Phosphoric acid is always applied at the rate of 40 lbs. per rood plot, potash at the rate of 30 lbs. per rood plot, and nitrogen at the rate of 10 lbs. per rood plot; unless otherwise indicated. The only differences in these substances lie in the form in which they are applied. That being the case, it is not to be expected that there should be any very great difference in the results of the plots which receive all three constituents in exactly equivalent amounts.

The following table, No. 1, shows the amount of crop derived from the first thirty rood plots at both stations, and what proportion of that was derived from the two halves of each plot, viz., the half which was manured in January and the half which was manured in May.

The weights refer to the bulbs alone, as it was found to be impossible to weigh the tops. These were allowed to remain on the land.

No. I.—Turnip Crop 1882.

No. of Plot.	Manures.		*Pumpherston.*			*Harelaw.*		
			Winter Manuring.	Spring Manuring.	Total Rood Plot.	Winter Manuring.	Spring Manuring.	Total Rood Plot.
	Phosphatic Manures—		T. cwt.qr.	T. cwt.qr.	T. cwt.qr.	T. cwt.qr.	T. cwt.qr.	T. cwt.qr.
1	Bone ash,	With nitrate of soda and potash salts,	2 0 2	2 0 1	4 0 3	3 2 3	3 4 0	6 6 3
2	Do. dissolved,		2 7 2	1 17 2	4 5 0	3 8 2	3 9 0	6 17 2
3	Ground coprolites,		1 17 1	1 18 1	3 15 2	3 6 0	3 5 2	6 11 2
4	Do. dissolved,		2 5 2	2 2 1	4 7 3	3 12 0	3 8 3	7 0 3
5	Bone meal,		1 16 2	1 15 0	3 11 2	3 4 0	3 1 3	6 5 3
6	Do. dissolved,		2 0 3	2 2 3	4 3 2	3 6 0	3 5 1	6 11 1
7	Phosphatic guano,		2 0 3	2 1 3	4 2 2	3 6 3	3 4 3	6 11 2
8	Do. dissolved,		2 5 3	2 6 0	4 11 3	3 10 2	3 7 3	6 18 1
9	Ground Charleston phos.		1 10 2	1 16 2	3 7 0	3 1 0	3 0 0	6 1 0
10	Do. dissolved,		2 5 3	2 4 1	4 10 0	3 10 0	3 8 1	6 18 1
11	No phosphates,		1 0 1	1 1 3	2 2 0	3 3 2	3 1 0	6 3 2
12	Bone ash alone,		1 2 3	1 6 0	2 8 3	2 19 1	3 1 2	6 0 3
	Nitrogenous Manures—							
13	Nitrate of soda,	With superphosphate and potash,	...	...	3 17 3	...	...	6 17 2
14	Sulphate of ammonia,		...	...	3 9 3	...	...	7 2 1
15	Shoddy,		1 17 2	1 3 2	3 1 0	...	...	...
	Horn dust,		...	...	...	3 15 3	3 6 0	7 1 3
16	Dried blood,		1 11 2	1 12 2	3 4 0	3 4 3	3 1 0	6 5 3
17	No nitrogen,		0 19 3	0 15 3	1 15 2	3 10 3	3 4 0	6 14 3
18	Nitrogen of soda alone,		1 13 2	1 17 0	3 10 2	3 1 3	3 6 2	6 8 1
	Potash Manures—							
19	Sulphate of potash,	With superphos. and nitrate of soda.	2 4 1	1 15 1	3 19 2	3 8 3	3 7 1	6 16 0
20	Muriate of potash,		1 14 3	1 18 0	3 12 3	3 11 0	3 10 0	7 1 0
21	No potash,		1 16 1	1 3 1	2 19 2	3 5 0	3 8 3	6 13 3
22	Potash of salts alone,		0 16 3	0 16 3	1 13 2	2 19 1	3 4 3	6 4 0
	Guanos—							
23	Peruvian guano,		1 19 2	1 13 3	3 13 1	3 9 1	3 8 0	6 17 1
24	Fish do.,		1 3 0	1 8 2	2 11 2	2 16 3	3 10 1	6 7 0
25	Ichaboe do.,		1 8 2	1 10 3	2 19 1	3 13 0	3 7 0	7 0 0
26	Unmanured since 1879,		1 4 1	1 2 3	2 7 0	2 16 3	2 16 1	5 13 0
27	Unmanured since the beginning,		1 1 3	1 2 0	2 3 3	2 17 2	2 18 0	5 15 2
	Superphosphates—							
28	10 % soluble phosphate,	With sulp. of ammon. and mur. of potash,	1 15 1	1 13 0	3 8 1	3 10 2	3 10 0	7 0 2
29	25 % Do. do.,		2 2 0	1 17 3	3 19 3	3 10 0	3 5 3	6 15 3
30	40 % Do. do.,		1 15 0	1 5 2	3 0 2	3 7 3	3 5 1	6 13 0

The first thing which strikes one on glancing over these columns is that the produce at Pumpherston station is not much more than half that at Harelaw, and that while the plots at Pumpherston show considerable variation, those at Harelaw are

comparatively uniform. We see at once that at Pumpherston there is a poor soil, where the crop depends for its nourishment upon the manure which is immediately applied to it, whereas at Harelaw the manurial wealth contained in the soil is so considerable that the turnip crop is practically quite independent of the limited amount of manure applied in the experiments. It is evident that for a slow-growing crop like turnips, where the roots have six months or more to go in search of nourishment, the soil at Harelaw is not very suitable for a manurial experiment of the kind we are engaged in.

We are endeavouring to determine the relative efficacy of manures of a closely allied character, and all brought up to the same manurial standard. It is evident that the distinctions we wish to observe have been overpowered by the inherent strength of the soil at Harelaw, and that we shall have to exercise extreme caution in drawing conclusions from such feeble indications. On that account it will be convenient to consider chiefly the data supplied by Pumpherston station, and thereafter to compare them with the indications furnished at Harelaw.

The kind of manures which claim our chief attention in the case of a turnip crop are of course the phosphates, the various kinds of which form the first ten plots.

They are divided into two classes, soluble and insoluble, and also into two parts, a winter-manured half and a summer-manured half, as is shown in table No. II. :—

No. II.—Phosphate Plots.

Pumpherston.

Plot.		Undissolved.		Plot.	Dissolved.	
		Manured in January.	Manured in May.		Manured in January.	Manured in May.
	Per ½ rood.	Ton cwt. qr.	Ton cwt. qr.		Ton cwt. qr.	Ton cwt. qr.
1	Bone ash, . . .	2 0 2	2 0 1	2	2 7 2	1 17 2
3	Coprolites, . . .	0 17 1	1 18 1	4	2 5 2	2 2 1
5	Bone meal, . . .	1 16 2	1 15 0	6	2 0 3	2 2 3
7	Phosphatic guano, .	2 0 3	2 1 3	8	2 5 3	2 6 0
9	Charleston phos., . .	1 10 2	1 16 2	10	2 5 3	2 4 1
	Total, . .	9 5 2	9 11 3	...	11 5 1	10 12 3
	Average, .	1 17 0	1 18 2	...	2 5 0	2 2 2
	Harelaw.					
1	Bone ash, . . .	3 2 3	3 4 0	2	3 8 2	3 9 0
3	Coprolites, . . .	3 6 0	3 5 2	4	3 12 0	3 8 3
5	Bone meal, . . .	3 4 0	3 1 3	6	3 6 0	3 5 1
7	Phosphatic guano, .	3 6 3	3 4 3	8	3 10 2	3 7 3
9	Charleston phos., . .	3 1 0	3 0 0	10	3 10 0	3 8 1
	Total, . .	16 0 2	15 16 0	...	17 7 0	16 19 0
	Average, .	3 4 0	3 3 1	...	3 9 2	3 8 0

The first thing to notice here is that the dissolved phosphates have again, as in former occasions, produced a larger crop. At Pumpherston the difference is 17 per cent. and at Harelaw 8 per cent. in favour of the dissolved phosphate, so far as mere gross weight of turnips is concerned.

The difference between the winter and summer manured plots is not very striking. On the whole, it is in favour of the early application of manure, but it must seem a remarkable circumstance that the plots which received dissolved phosphates have gained most by early manuring. The object which one would naturally have in view in applying an insoluble manure some months before sowing the seed, would be to give it time to dissolve in the soil before the coming of the roots of the crop. In all fertile soils chemical changes are going on which have the effect of rendering the insoluble phosphates contained in them, or added to them as manure, more easily attackable by the roots of plants, and the nature and composition of soils possessing that character in a high degree, have been the subject of special study by various chemists. Soils rich in organic matter are especially found to possess that property, and it will be seen that the soil at Harelaw which is richer in organic matter than that of Pumpherston, has profited to some extent by the earlier application of insoluble phosphates; while the latter soil, which is more clayey with a tilly subsoil, has had the effect of diminishing rather than increasing the solubility of the raw phosphates. With the dissolved phosphates the case has been different. At both stations the early application of superphosphate has been advantageous, but especially so at Pumpherston. This is an unexpected result. One would naturally have supposed that the sooner the soluble phosphate came in contact with the roots of the crop the more rapid and effective would be its action. On the other hand, we must remember that soluble phosphates when applied to the soil are very rapidly precipitated or rendered insoluble by combining with the lime, oxide of iron, and alumina contained in the soil, and it is highly probable that little or none of the phosphate is taken up by the roots of plants until it has been precipitated. The roots of plants themselves are able to dissolve some forms of insoluble phosphate very readily, and it is probable that during the winter the soluble phosphate was more widely and uniformly precipitated than that applied with the seed. There are other circumstances which must not be lost sight of in endeavouring to explain this result, viz., that the superphosphate in these plots was not applied alone, for potash salts accompanied it, and that in superphosphate itself we have sulphuric acid as well as phosphoric acid to consider. It might be explained that the advantage was not directly due to any improvement in the condition of the phosphate, but indirectly to

the washing down of potash or sulphuric acid during the winter. That view, however, is not supported by the experiments on other plots, for on plots 11 and 22, where potash was applied without phosphate, there is very little difference between the summer and winter manuring, and in plot 21, which received superphosphate without potash, the same beneficial result of early manuring is observed; while plot 38, which had sulphuric acid applied to it at both seasons, shows no advantage from the earlier application. The advantage obtained by the early application of superphosphate is also shown in plots 28, 29, and 30, where the plot to which the most soluble phosphate was applied derived greatest benefit from the winter manuring. It is evident that we have here a very interesting fact brought out, which requires further investigation.

Regarding the nitrogenous manures, the two chief manures of the kind are nitrate of soda and sulphate of ammonia. The plots 13 and 14, in common with the rest of the station, did not receive these manures till after the turnips were thinned. They are two very even plots, a slight advantage lying sometimes with the one and sometimes with the other; upon the whole, however, there seems to be a gradual improvement taking place in plot 13 at Pumpherston.

Of the slowly-acting nitrogenous manures, half was applied in winter and half in summer, and it is evident that they have been improved by lying in the soil for some months before sowing. This is especially seen on plot 15, where shoddy was again tried at Pumpherston, owing to there being no horn dust obtainable. The shoddy was on this occasion dissolved along with the phosphate, and thus put into a state more favourable for the plant than in 1879, when it was put on in the undissolved condition. The result has proved that dissolved shoddy, if allowed to be long enough in the soil, is capable of acting as a manure, and that manufacturers who use shoddy as a source of nitrogen in their "dissolved bones," or other dissolved manures, are employing a material which in the dissolved state may be a useful nitrogenous manure, if only applied early enough. The late applied shoddy has proved a failure. This is an experiment which would require to be repeated before one could have any definite assertion to make regarding the relative value of dissolved shoddy.

Plot 15, at Harelaw, was manured with fine horn dust, and this manure has done very well, but not so well as might have been expected from the success which attended its application to cereals.

Dried blood has not done so well as we should have expected. It is probable that early manuring has been a little overdone in this case. Had it been applied only one or two months before sowing, the effect might have been better, for when dried

blood once begins to decompose the process goes on rapidly, and it is probable that the products of its decomposition may have been washed away to some extent during the winter.

The potash plots confirm their former indications. The sulphate always a little better at Pumpherston, while at Harelaw the difference is slightly the other way. There is not seen here the advantage in the early manured parts so distinctly as might be expected, but it must be remembered that a turnip crop is not a good one for testing the best time to apply potash, as the want of the turnip for potash seems easily supplied.

The guano plots maintain their former relative positions, and if the crop is a poor one it must be remembered that a comparatively small amount of the manure is employed. Owing to their richness in nitrogen, the limit of 40 lbs. per acre applied to that constituent prevented their receiving quite their due proportion of phosphates. They were not made up to strength in any way, but the total application was regulated by the nitrogen. The fish guano is the only one which has not profited by the early manuring, and yet it is the one from which most advantage was expected.

The plots 28, 29, and 30, manured with superphosphate of various degrees of solubility, again show the advantage to lie with the medium superphosphate, and this is especially noticeable in the winter-manured half of Pumpherston. The highest class superphosphate has produced the poorest crop at both stations.

The unmanured plots (26 and 27) have produced about half a crop at Pumpherston, and somewhat more than three-quarters of a crop at Harelaw. They are not the lowest on the station at Pumpherston, for there are worse things that may happen to a crop than the withholding of all manure. A manure may be applied which does more harm than good, and it would seem that potash is such a manure on this soil. Potash is not unfrequently found to injure the turnip crop, and at Pumpherston the sole application of potash to the turnip crop has all along had a very injurious effect. It does not seem that the early application of this manure has done anything to lessen the mischief on plot 22; and the generally accepted opinion that the early application of potash manures diminishes their chance of doing injury receives no support from the experiments this year at either station.

So much for the gross weight of the crop as carried from the field, but this gives us very little idea of the actual amount of food produced upon each plot.

We must now examine the produce according to the amounts of its various constituents. In the first place, most abundant

and least important comes water. This will be found in the accompanying tables, Nos. III. and IV., where along with the percentage of water and solids there are given the total weight per acre and the weight of solid matter per acre produced by each half plot.

The proportion of water in turnips is usually stated roughly at 90 per cent., but this number, while it may be pretty near the mark for swedes, is too low for turnips, as may be seen from the average composition of the thirty plots at both stations.

Stations.	Winter Manured.		Spring Manured.	
	Water per cent.	Solids per cent.	Water per cent.	Solids per cent.
Pumpherston, . .	91·2	8·8	91·3	8·7
Harelaw, . . .	92·5	7·5	92·7	7·3

One or two per cent. makes little difference to the total proportion of water, and if the water were the valuable constituent here, the slight variations seen on these tables would scarcely be worth regarding; but it is with the solids we have to do. All the feeding material of a turnip is contained in the solids, and the water is only water and nothing else. Many farmers find it difficult to credit this, and are fain to believe that there is something more than water in the water of turnips. The term water in the above analyses does not refer to sap, for the sap of turnips contains a considerable quantity of solid matter in solution. It is only the actual water of that sap which is reckoned in these figures.

The intimate manner in which the water of turnips is combined with the solid matter enables the latter to be easily eaten and digested, but the proportion of water in turnips is excessive from a feeding point of view, and any manurial treatment which has the effect of increasing the proportion of solid matter in turnips, even to a slight extent, is of importance to feeders.

We see here that the turnips at Pumpherston were much richer than those at Harelaw. They were a firm solid turnip, such as stock-feeders like, but they were small, so that the increase in quality was got at a sacrifice of quantity. The Harelaw turnips were soft, and many of them very spongy, but they were of good average size, and the quantity of solid turnip matter grown per acre was nearly double that produced on the poorer station.

Increase of quantity of solid matter per acre does not altogether compensate for decrease in percentage of solids, for

turnips with a low percentage of solids form a diet so weak that cattle cannot fatten on it. The quantity of water they are compelled to consume, in the endeavour to obtain the nourishment they require, is so great that the limit of their capacity is

No. III.—Pumpherston.

No. of Plot.	Manures.		Manures applied in January.				Manures applied in May.			
			Crop per acre.	Water per cent.	Solids per cent.	Solids per acre.	Crop per acre.	Water per cent.	Solids per cent.	Solids per acre.
	Phosphatic Manures.		Tons.			lbs.	Tons.			lbs.
1	Bone ash,	With nitrate of soda and potash salts,	16·2	90·93	9·07	3290	16·1	91·55	8·45	3046
2	Do. dissolved,		19·0	91·51	8·49	3613	15·0	91·51	8·49	2851
3	Ground coprolites.		14·9	91·52	8·43	2829	15·3	91·38	8·62	2954
4	Do. dissolved,		18·2	91·78	8·22	3351	16·9	91·44	8·56	3240
5	Bone meal,		14·6	91·02	8·98	2936	14·0	91·51	8·49	2662
6	Do. dissolved,		16·3	90·98	9·02	3292	17·1	92·09	7·91	3029
7	Phosphatic guano,		16·3	92·19	7·81	2880	16·7	92·79	7·21	2696
8	Do. do. dissolved,		18·3	91·29	8·71	3569	18·4	91·08	8·92	3676
9	Ground Charleston phos.		12·2	91·36	8·64	2361	14·6	91·58	8·42	2753
10	Do. do. dissolved,		18·3	91·16	8·84	3622	17·7	91·53	8·47	3357
11	No phosphate,		8·1	91·27	8·73	1584	8·7	91·44	8·56	1668
12	Bone ash alone, ...		9·1	90·51	9·49	1934	10·4	90·79	9·21	2145
	Nitrogenous Manures.									
13	Nitrate of soda,	With superphosphate and potash salts,	16·5	92·09	8·00	2957	14·6	91·39	8·61	2815
14	Sulphate of ammonia,		13·8	90·61	9·39	2902	14·1	91·33	8·67	2737
15	Dissolved shoddy,		15·0	91·02	8·98	3018	9·4	90·67	9·33	1964
16	Dried blood,		12·6	90·72	9·28	2618	13·0	90·72	9·28	2701
17	No nitrogen,		7·9	91·95	8·05	1424	6·3	90·92	9·08	1281
18	Nitrate of soda alone, ...		13·4	91·68	8·32	2496	14·8	91·70	8·30	2750
	Potassic Manures.									
19	Sulphate of potash,	With superph. and nitrate of soda,	17·7	91·96	8·04	3187	14·1	91·59	8·40	2655
20	Muriate of potash,		13·9	91·55	8·45	2631	15·2	91·98	8·02	2730
21	No potash,		14·5	91·84	8·16	2650	9·3	92·72	7·28	1516
22	Potash salts alone, ...		6·7	90·53	9·47	1421	6·7	90·68	9·32	1399
	Guanos.									
23	Peruvian guano, ...		15·8	90·81	9·19	3252	13·5	90·46	9·54	2885
24	Fish do., ...		9·2	90·59	9·41	1939	11·4	91·14	8·86	2262
25	Ichaboe do., ...		11·4	91·20	8·80	2246	12·3	91·20	8·80	2425
26	Unmanured since 1879, ...		9·7	90·97	9·03	1962	9·1	90·52	9·48	1932
27	Unmanured, ...		8·7	90·32	9·68	1886	8·8	90·35	9·65	1902
	Superphosphates.									
28	10% Soluble phosphate,	With sulp. of ammonia and potash salts,	14·1	91·06	8·94	2823	13·2	91·16	8·84	2613
29	25% Do. do.,		16·8	91·18	8·82	3318	15·1	91·22	8·78	2409
30	40% Do. do.,		14·0	91·59	8·41	2637	10·2	91·32	8·68	1982

reached before they have eaten enough to enable them to put on flesh, and they will remain at a certain low level of condition corresponding to the wateriness of the turnip. To enable stock to advance in such a case requires the use of an additional

No. IV.—Harelaw.

No. of Plot.	Manures.	Manures applied in January.				Manures applied in May.			
		Crop per acre.	Water per cent.	Solids per cent.	Solids per acre.	Crop per acre.	Water per cent.	Solids per cent.	Solids per acre.
	Phosphatic Manures.	Tons.			lbs.	Tons.			lbs.
1	Bone ash,	25·1	92·80	7·20	4048	25·6	92·47	7·53	4318
2	Do. dissolved,	27·4	92·99	7·01	4302	27·6	93·34	6·66	4117
3	Ground coprolites,	26·4	93·02	6·98	4128	26·2	93·05	6·95	4079
4	Do. dissolved,	28·8	92·77	7·23	4664	27·5	92·98	7·02	4324
5	Bone meal,	25·6	92·72	7·28	4175	24·7	92·45	7·55	4177
6	Do. dissolved,	26·4	92·53	7·47	4417	26·1	92·99	7·01	4108
7	Phosphatic guano,	26·7	92·70	7·30	4368	25·9	92·70	7·30	4235
8	Do. do. dissolved,	28·2	92·83	7·17	4529	27·1	92·90	7·10	4210
9	Ground Charleston phos.,	24·4	92·78	7·22	3946	24·0	92·78	7·22	3881
10	Do. do. dissolved,	28·0	91·75	7·25	4547	27·3	93·19	6·81	4164
11	No phosphate,	25·4	92·59	7·41	4220	24·4	93·10	6·90	3771
12	Bone ash alone,	23·7	92·64	7·36	3907	24·5	92·70	7·39	4022
	Nitrogenous Manures.								
13	Nitrate of soda,	27·0	92·12	7·88	4765	23·0	92·85	7·16	4490
14	Sulphate of ammonia,	28·8	92·36	7·64	4929	28·1	92·32	7·68	4834
15	Horn dust,	30·3	92·09	7·91	5369	26·4	92·83	7·17	4240
16	Dried blood,	25·9	92·62	7·38	4281	24·4	92·32	7·68	4197
17	No nitrogen,	28·3	92·34	7·66	4856	25·6	92·29	7·71	4421
18	Nitrate of soda alone,	24·7	92·40	7·60	4205	26·6	92·57	7·43	4426
	Potassic Manures.								
19	Sulphate of potash,	27·5	92·38	7·62	4694	26·9	92·45	7·55	4549
20	Muriate of potash,	28·4	92·78	7·22	4593	28·0	93·14	6·86	4302
21	No potash,	26·0	92·31	7·69	4478	27·5	92·75	7·25	4466
22	Potash salts alone,	23·7	91·15	8·85	4698	25·9	91·75	8·21	4875
	Guanos.								
23	Peruvian guano,	27·7	92·64	7·36	4566	27·2	92·34	7·66	4666
24	Fish do.,	22·7	92·43	7·57	3849	28·1	92·32	7·68	4854
25	Ichaboe do.,	29·2	92·47	7·53	4925	26·8	92·40	7·60	4552
26	Unmanured since 1879,	22·7	92·06	7·94	4036	22·5	92·13	7·87	3966
27	Unmanured,	29·0	91·91	8·09	4168	23·2	92·05	7·95	4078
	Superphosphates.								
28	10% Soluble phosphate,	28·2	92·59	8·41	4680	28·0	93·17	6·83	4782
29	25% Do. do.,	28·0	92·14	7·86	4929	26·3	93·08	6·92	4076
30	40% Do. do.,	27·1	92·84	7·16	4346	26·1	93·02	6·08	4079

With nitrate of soda and potash salts,

With super-phosphate and potash salts,

With superph. and nitrate of soda,

With sulp. of ammonia and potash salts,

quantity of a more concentrated fodder. We thus see that the quantity of solid matter per acre, although it is a much better criterion of the value of a crop than the gross weight of bulbs per acre, is still not everything; the percentage of solids is an important matter, and even a very little increase in that percentage is an advantage.

The figures in these tables show us that manuring has something to do with quality in a turnip. Thus it is seen that at both stations the parts manured in winter have produced a slightly denser turnip than those manured in spring, and it can be shown that this advantage is not got at a sacrifice of quantity. A comparison of the first ten plots shows this very clearly.

No V.—Pumpherston.

Undissolved Phosphates.

No. of Plot.	Manures.	Manures applied in January.			Manures applied in May.		
		Crop per acre.	Solids per cent.	Solids per acre.	Crop per acre.	Solids per cent.	Solids per acre.
		Tons.		lbs.	Tons.		lbs.
1	Bone ash, . . .	16·2	9·07	3290	16·1	8·45	3046
3	Ground coprolites, .	14·9	8·48	2829	15·3	8·62	2954
5	Bone meal, . .	14·6	8·98	2936	14·0	8·49	2662
7	Phosphatic guano, .	16·3	7·81	2880	16·7	7·21	2696
9	Charleston phosphate,	12·2	8·64	2361	14·6	8·42	2753
	Average, .	14·8	8·59	2859	15·3	8·24	2822
	Dissolved Phosphates.						
2	Bone ash, . . .	19·0	8·49	3613	15·0	8·49	2851
4	Ground coprolites, .	18·2	8·22	3351	16·9	8·56	3240
6	Bone meal, . .	16·3	9·02	3292	17·1	7·91	3029
8	Phosphatic guano, .	18·3	8·71	3569	18·4	8·92	3676
10	Charleston phosphate,	18·3	8·84	3622	17·7	8·47	3357
	Average, .	18·0	8·66	3489	17·0	8·47	3231

At Pumpherston, the winter-applied raw phosphates produced on an average 14·8 tons per acre, while the summer-applied phosphates produced 15·3 tons per acre. This is a surprising result, but the surprise is diminished when the solids are considered. The winter-manured turnips are seen to be considerably denser than the summer-manured ones, and the result is that with less gross weight they nevertheless contain more solid matter per acre. What the relative value of the solids in each case is will be seen hereafter. It will be noticed that the results at Harelaw are at variance with these. The differences there are very trifling, but they are in an opposite direction.

No. VI.—Harelaw.

Undissolved Phosphates.

No. of Plot	Manures.	Manures applied in January.			Manures applied in May.		
		Crop per acre.	Solids per cent.	Solids per acre.	Crop per acre.	Solids per cent.	Solids per acre.
		Tons.		lbs.	Tons.		lbs.
1	Bone ash, . . .	25·1	7·20	4048	25·6	7·53	4318
3	Ground coprolites, .	26·4	6·98	4128	26·2	6·95	4079
5	Bone meal, . .	25·6	7·28	4175	24·7	7·55	4177
7	Phosphatic guano, .	26·7	7·30	4368	25·9	7·30	4235
9	Charleston phosphate,	24·4	7·22	3946	24·0	7·22	3881
	Average, .	25·6	7·19	4133	25·3	7·31	4138
	Dissolved Phosphates.						
2	Bone ash, . . .	27·4	7·01	4302	27·6	6·66	4117
4	Ground coprolites, .	28·8	7·23	4664	27·5	7·02	4324
6	Bone meal, . .	26·4	7·47	4417	26·1	7·01	4098
8	Phosphatic guano, .	28·2	7·17	4529	27·1	7·10	4210
10	Charleston phosphate,	28·0	7·25	4547	27·3	6·81	4164
	Average, .	27·8	7·23	4492	27·1	6·92	4183

With the soluble phosphate plots the case is different. Here both stations are at one, and they unite in showing that the winter-manured turnips were both heavier and denser than the others, and the result is that from 250 to 300 lbs. more solid matter per acre have been produced by the earlier application.

So far as the total yield of solid matter per acre is concerned, the results are in favour of the earlier application of manures, but especially of superphosphate.

It is not sufficient, however, to know the amount of solids per acre only, we must know what the solids are composed of before we are in a position to decide where the advantage lies. The solid matter of turnips exhibits great variation in composition, and two turnips may have an equal amount of solids, and yet the one may possess nearly double the feeding value of the other.

The constituents of the solid matter of turnips may be divided into four classes, viz., albuminoid matter, carbohydrates, woody fibre, and ash. Besides these, there are other constituents which will be referred to hereafter. The first two are substances useful as food, and the remaining two are comparatively useless for that purpose. The last of these, although of little importance as regards the feeding quality of the turnip, is nevertheless of considerable importance from a manurial point of view, and as it affects the exhaustion of the land. It will be convenient to

consider these two first. In the following table (No. VII.) is given the percentages of ash and woody fibre at both stations:—

No. VII.—Ash and Woody Fibre—Turnips.

No. of Plot.	Manures.		*Pumpherston.*				*Harelaw.*			
			Ash of solids.		Woody fibre of solids.		Ash of solids.		Woody fibre of solids.	
			Time of Manuring.				Time of Manuring.			
			Winter.	Spring.	Winter.	Spring.	Winter.	Spring.	Winter.	Spring.
	Phosphatic Manures.		p. cnt.	p. cnt.	p. cnt.	p. cnt.	p. cnt.	p. cnt.	p. cnt.	p. cnt.
1	Bone ash,	With nitrate of soda and potash salts,	5·90	5·56	10·1	10·8	6·25	6·30	10·5	10·6
2	Do. dissolved,		6·48	6·25	9·3	10·0	7·11	6·95	11·2	10·8
3	Ground coprolites,		6·36	6·32	9·2	9·0	6·55	6·80	9·8	10·9
4	Do. dissolved,		6·72	6·40	9·6	9·8	6·49	6·37	11·3	11·5
5	Bone meal,		5·37	5·23	10·1	9·7	6·41	6·40	12·7	11·9
6	Do. dissolved,		5·51	5·19	9·8	10·9	6·73	6·66	11·5	11·7
7	Phosphatic guano,		6·44	6·31	11·9	11·1	6·95	6·25	12·0	10·8
8	Do. do. dissolved,		5·96	5·69	11·0	10·5	6·95	6·71	11·8	10·5
9	Ground Charleston phos.,		5·85	5·60	10·8	11·2	6·37	6·72	10·1	11·4
10	Do. do. dissolved,		5·97	5·73	9·7	10·6	6·90	6·94	9·9	10·8
11	No phosphate,		6·22	6·00	12·0	11·7	6·34	6·90	11·6	11·4
12	Bone ash alone,		4·76	4·81	10·1	12·2	5·96	6·57	10·7	11·0
	Nitrogenous Manures.									
13	Nitrate of soda,	With superphosphate and potash salts,	6·30	5·90	10·2	10·6	6·65	6·80	11·6	11·5
14	Sulphate of ammonia,		5·83	5·74	9·9	10·2	6·51	6·32	11·7	12·6
15	Dis. shoddy (Pumph.), Horn dust (Harelaw),		5·09	5·04	12·5	12·7	5·85	6·00	13·3	14·1
16	Dried blood,		5·95	5·16	11·2	10·8	5·72	6·17	12·6	12·3
17	No nitrogen,		6·27	5·88	12·7	12·0	5·73	5·69	13·1	14·9
18	Nitrate of soda alone,		6·11	6·00	9·1	12·1	6·68	6·72	10·4	10·7
	Potassic Manures.									
19	Sulphate of potash,	With superph. and nitrate of soda,	6·47	6·37	10·7	11·3	6·64	6·61	11·9	11·5
20	Muriate of potash,		6·12	6·25	11·3	11·5	6·20	6·26	11·7	12·0
21	No potash,		6·56	7·07	13·0	13·4	7·13	7·01	14·4	14·2
22	Potash salts alone,		6·04	5·80	9·5	8·9	6·64	6·23	11·1	11·5
	Guanos.									
23	Peruvian guano,		6·42	6·35	11·4	11·5	6·10	6·06	12·5	12·1
24	Fish do.,		6·62	6·91	11·8	11·3	6·35	6·15	11·3	10·7
25	Ichaboe do.,		6·35	6·27	10·2	9·8	6·80	6·43	10·4	10·6
26	Unmanured since 1879,		5·59	5·45	9·9	10·8	5·92	5·74	11·0	11·8
27	Unmanured,		5·70	5·67	11·8	12·0	5·48	5·33	13·2	13·7
	Superphosphates.									
28	10% Soluble phosphate,	With sulp. of ammonia and potash salts,	6·30	6·06	11·3	11·6	5·80	6·35	11·5	12·1
29	25% Do. do.,		6·29	6·12	9·3	10·1	6·00	5·80	10·4	11·3
30	40% Do. do.,		6·16	6·27	10·2	9·8	6·25	6·20	12·2	10·8
	Average,		6·06	5·91	10·6	10·9	6·38	6·38	11·6	11·7

The amount of ash contained in the dry matter is greater at Harelaw than at Pumpherston; the turnips which contained the larger proportion of water thus contained the larger proportion of ash, the average over the whole plots of the stations being—

	Water, per cent.	Dry matter, per cent.	Ash in dry matter, per cent.
Pumpherston, . .	91·3	8·7	5·8
Harelaw, . . .	92·6	7·4	6·4

The average amount of ash in the dry matter of the crop in 1879 was about 8·5 per cent., and now it is not so much as 6·5 per cent. This result may be due to various causes, such as the shorter time during which the crop was allowed to remain on the land, and the very different condition in which the crop was secured; and perhaps the system of manuring to which the land has been subjected may contribute towards the result, but the method in which the ash was determined has no doubt much to do with it. The amount of ash formed depends very much on the method of incineration employed.

For the purpose of this investigation, the absolute amount of ash contained in the roots is not of much importance, as it is the relative proportions obtained by various modes of manuring that are of chief interest. The essential thing to observe is that all the samples be treated in the same way, and in the above analysis the ash was determined in a very thorough manner. Dry turnip powder is not easily incinerated; it coheres into a mass which prevents the access of air, and is found to be dark coloured even after prolonged incineration, and the greater the quantity employed the more imperfect is the ash. The method adopted on this occasion was to take two grammes of the fine dry turnip powder and mix with it one gramme of pure white sand recently ignited and cooled in a drying chamber. This was placed in a small platinum tray, and kept for an hour at a low red heat in a muffle furnace. The somewhat coherent mass was then gently pressed down with a glass plate exactly fitting the tray, and then carefully stirred. The tray was then replaced in the muffle and kept there for half an hour, when a perfectly homogeneous white ash was obtained. The ashes were all done in duplicate, and the duplicates were usually found to agree with each other very closely. When larger quantities are used, and no sand employed, the results are far from uniform, and always higher than those obtained by the method here described. In all cases where the duplicate samples differed from each other

by more than 1 per cent. of the total ash, other two samples were incinerated side by side, and the average taken. When the samples are made with the utmost care as to fine grinding and thorough mixture, and the whole process carried out with perfect uniformity in every particular, a difference of 1 per cent. of the total ash rarely occurs. It will be seen from Table VII. that when every precaution has been taken to eliminate variations due to analysis, there are considerable differences in the percentage of ash over the plots on the station, but it would be a mistake to suppose that these are entirely due to difference of manurial treatment. Two turnips taken from the same plot, and even growing side by side and resembling each other in size and external appearance, do not always agree in the percentage of ash they contain. Individual turnips differ from each other in this respect, and when the turnips are of different size and firmness, there may be a wide variation in the percentage of ash. This irregularity may be minimised by increasing the number of roots from which each sample of dry matter is made; and while that has been done in an extraordinary manner in this investigation, there is no doubt that the figures before us must still be looked upon as approximations only, in considering how far manuring of different kind affects the amount of ash in turnips. As a rule, it is noticed

No. VIII.—Percentage of Ash contained in Dry Matter.

Undissolved Phosphates.

No. of Plot.	Manures.	*Pumpherston.*		*Harelaw.*	
		Manured in Jan.	Manured in May.	Manured in Jan.	Manured in May.
	per acre.	per cent.	per cent.	per cent.	per cent.
1	Bone ash,	5·90	5·56	6·25	6·30
3	Ground coprolites,	6·36	6·32	6·55	6·80
5	Bone meal,	5·37	5·23	6·41	6·40
7	Phosphatic guano,	6·44	6·31	6·95	6·25
9	Charleston phosphate,	5·85	5·60	6·37	6·72
	Average,	5·95	5·80	6·51	6·49
	Dissolved Phosphates.				
2	Bone ash,	6·48	6·25	7·11	6·95
4	Coprolites,	6·72	6·40	6·49	6·37
6	Bone meal,	5·51	5·19	6·73	6·66
8	Phosphatic guano,	5·96	5·69	6·95	6·71
10	Charleston phosphate,	5·97	5·73	6·90	6·94
	Average,	6·13	5·85	6·84	6·73

that the proportion of ash is greatest in those plots with full manure, and least on those which are unmanured, or from which some constituent has been withheld. Turnips, like other plants, take up more mineral matter than they require for their growth, if an abundance of it is presented to their roots. The average percentage of ash contained in the winter-manured section at Pumpherston is greater than that in the summer-manured section, and a comparison of the first ten plots (Table VIII.) shows that peculiarity, and also shows that the proportion of ash is greater when phosphates are applied in the dissolved state.

The ash over the whole station at Harelaw is not affected by the difference in the time of application of the manures, but as regards the phosphate plots the two stations show quite concordant results. The increase of ash due to the dissolving of the phosphates is quite as marked at the one station as at the other, and this result confirms that obtained in former years.

The percentage of ash does not rise and fall proportionately with the amount of dry matter, nor yet with the amount of crop per acre, so that the total ash per acre cannot be determined from these data. This is shown on Table IX., where the total amount of ash per acre is shown in comparison with the total dry matter. The amount of ash per acre gives an approximation to the amount of mineral matter removed from the soil by the crop. It is only an approximation, for the mineral matter in the plant suffers considerable change in the process of incineration, the organic salts are converted mostly into carbonates, while small amounts of chlorides are volatilised and lost. But it is sufficient for our purpose to consider the ash as a good measure of the mineral matter lost to the soil by the crop. The average ash on the two stations is given in the last line of the table. The plots whose ash falls below the average mark are those deficient in nitrogen, or whose nitrogen was supplied in an insoluble and slow-acting form. It is the amount of nitrogenous manure of a soluble kind in the manure or in the soil that determines the amount of mineral matter in the crop. Plots 17 and 18 show this very well. On plot 17 phosphate and potash salts have been yearly applied, and yet the amount of mineral matter the crop is able to take up is much smaller than that taken up by plot 18, which has had nothing but nitrate of soda applied to it for five years. The nitrate of soda has enabled the mineral matter in the soil to be used by the crops, and the process would go on until the available mineral matter in the soil was not sufficent to yield half a crop. At present it has enabled the crop to grow well, and extract mineral matter up to the total average of the station. Plot 17 is being preserved for future use, while plot 18 is being exhausted; but it is evident that the exhaustion is not

No. IX.—Mineral Matter removed from Soil per Acre, as indicated by Ash.

No. of Plot.	Manures.		*Pumpherston.* Time of Manuring. January. Solids.	*Pumpherston.* Time of Manuring. January. Ash.	*Pumpherston.* Time of Manuring. May. Solids.	*Pumpherston.* Time of Manuring. May. Ash.	*Harelaw.* Time of Manuring. January. Solids.	*Harelaw.* Time of Manuring. January. Ash.	*Harelaw.* Time of Manuring. May. Solids.	*Harelaw.* Time of Manuring. May. Ash.
	Phosphatic Manures.	per acre.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	Bone Ash,	With nitrate of soda and potash salts,	3290	194	3046	169	4048	253	4318	272
2	Do. dissolved,		3613	234	2851	178	4302	305	4117	286
3	Ground coprolites,		2829	180	2954	187	4128	270	4079	277
4	Do. dissolved,		3351	225	3240	207	4664	302	4324	275
5	Bone Meal,		2936	158	2662	139	4175	268	4177	267
6	Do. dissolved,		3292	181	3029	157	4417	297	4098	273
7	Phosphatic guano,		2880	185	2696	170	4368	264	4235	264
8	Do. do. dissolved,		3569	213	3676	209	4529	314	4210	282
9	Ground Charleston phos.,		2361	138	2753	154	3946	251	3881	260
10	Do. do. dissolved,		3622	216	3357	192	4547	313	4164	289
11	No phosphate,		1582	98	1668	100	4220	267	3771	260
12	Bone ash alone, ...		1934	92	2145	103	3907	233	4022	264
	Nitrogenous Manures.									
13	Nitrate of soda,	With superphosphate and potash salts,	2957	186	2815	166	4765	317	4490	305
14	Sulphate of ammonia,		2902	168	2737	161	4929	321	4834	305
15	Dis. shoddy (Pump.), Horn dust (Harelaw),		3018	154	1964	99	5369	314	4240	280
16	Dried blood,		2618	156	2701	139	4281	245	4197	259
17	No nitrogen,		1424	89	1281	75	4856	278	4421	251
18	Nitrate of soda alone, ...		2496	152	2750	165	4205	281	4426	297
	Potassic Manures.									
19	Sulphate of potash,	With superph. and nitrate of soda,	3187	206	2655	169	4694	312	4549	301
20	Muriate of potash,		2631	161	2730	170	4593	285	4302	269
21	No potash,		2650	174	1516	107	4478	319	4466	313
22	Potash salts alone, ...		1421	86	1399	81	4698	312	4875	304
	Guanos.									
23	Peruvian guano, ...		3252	208	2885	183	4566	278	4666	282
24	Fish do., ...		1939	128	2262	156	3849	244	4834	297
25	Ichaboe do., ...		2246	143	2425	152	4925	335	4552	292
26	Unmanured since 1879, ...		1962	110	1932	105	4036	239	3966	227
27	Unmanured, ...		1886	107	1902	108	4168	228	4075	217
	Superphosphates.									
28	10% Soluble phosphate,	With sulp. of ammonia and potash salt,	2823	178	2613	158	4680	271	4282	272
29	25% Do. do.,		3318	209	2409	147	4929	296	4076	236
30	40% Do. do.,		2637	162	1982	124	4346	271	4079	253
	Average, ...		2687	163	2468	148	4488	283	4290	274

very rapid, for it is able still to provide as much mineral matter to the plant as many plots to which mineral matter have been annually applied. The amount of mineral matter taken away by the crop per acre is important, as it affects the exhaustion of the land, but it is perhaps more important as it affects the redistribution of manure. When turnips are fed on the land the mineral matter they contain is distributed over the land in the dung of the stock, and thus the mineral matter derived from considerable depths is put into a most favourable position for being used by the succeeding crop. It is of some importance to know what kind of manures are best suited for giving roots rich in ash constituents, and therefore more advantageous for eating on land that is in poor condition.

A comparison of the first ten plots (Tables VIII. and X.) gives some very definite information on that point.

No. X.—Ash per Acre.

No. of Plot.	Manures.	*Pumpherston.*				*Harelaw.*			
		January.		May.		January.		May.	
		Insoluble.	Soluble.	Insoluble.	Soluble.	Insoluble.	Soluble.	Insoluble.	Soluble.
	per acre.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1 & 2	Bone ash, . . .	194	234	169	178	253	305	272	286
3 & 4	Coprolites, . . .	180	225	187	207	270	302	277	275
5 & 6	Bone meal, . . .	158	181	139	157	268	297	267	273
7 & 8	Phosphatic guano, .	185	213	170	209	264	314	264	282
9 & 10	Charleston phosphate,	138	216	154	192	251	313	260	289
	Average, .	171	214	164	209	261	306	268	281

There is a great difference between these results, and even the average results differ widely. At Pumpherston the quantity of mineral matter lifted by the crop from the soil on these plots manured with soluble phosphates in winter is on an average 214 lbs. per acre, while on these manured with insoluble phosphate in summer it is only 164 lbs. per acre—a difference of 30 per cent. in favour of the former.

The inference to be drawn from these results is that turnips grown with dissolved manures will, when consumed by stock, produce a manure containing a relatively large amount of mineral plant food, and in that respect are more valuable as a means of improving land.

The woody fibre contained in the dry matter of turnips is about 10 or 11 per cent. The smaller and firmer turnips of

Pumpherston contained less than the larger and softer ones at Harelaw (see Table VII.). By woody fibre is meant that part of the turnip which is undissolved after being boiled for an hour in a 5 per cent. acid solution, and then in a 5 per cent. alkaline one. The object of this method of treatment is to imitate in some measure the digestive powers in animals. The woody fibre which refuses to dissolve in these reagents is considered indigestible. The process is not a very accurate one, and the conclusions to be drawn from it are not perfectly reliable. Animals even of the same race are apt to differ widely in their digestive power, and the most we can say regarding the proportions of woody fibre contained in Table VII. is that they are all done in the same way, and that they may indicate the relative amount of indigestible matter in the turnips. It does not appear from these experiments that the connection between the manure employed and the proportion of woody fibre in the turnips is a very close one. There seems to be an increase of woody fibre when there is a want of vigour, so that plots receiving no nitrogenous manure or an insoluble one, such as plots 17 and 15, have much woody fibre. The want of potash also seems to increase the proportion of woody fibre, and it is somewhat remarkable that plot 22, which bore a poor and stunted crop, has producing turnips with the lowest proportion of woody fibre on the station.

From a feeding point of view—and that is the chief one where turnips are concerned—the proportions of ash and woody fibre are of secondary importance. They are the non-feeding part of the turnip.

The feeding value of turnips depends upon the amount they contain of albuminoid matter and of carbohydrates; the former includes substances resembling flesh in their composition, and the latter such substances as sugar, starch, and gum; and the oil which occurs to a greater or less extent in all fodder plants is usually reckoned along with these; the former are the nitrogenous and the latter the non-nitrogenous constituents of food. The proportion of these two constituents in fodder plants varies very greatly, and the ratio between them, or the nitrogen ratio, as it is called, determines the feeding value of the fodder. When the proportion of the nitrogenous constituents is small, the substance possesses a low feeding value, as in the case of straw; when it is great, as in the case of beans and oats, the feeding value is high. Turnips belong to the former category, and when it is desired to fatten an animal feeding on turnips, some more nitrogenous food, either natural or artificial, has usually to be added to its diet. The more albuminoid matter a turnip contains the greater is its feeding value, and it is well known that turnips differ widely in their feeding value. Analysis also

shows that the turnips which are most nutritious are those which contain the largest proportion of albuminoid matter. The proportion of albuminoid matter in turnips of the same kind, and grown from the same parcel of seed, varies in an extraordinary degree, and feeders are known to be of opinion that turnips grown on one farm may fatten an animal, while the same kind of turnips grown on another, it may be a neighbouring farm, may not. The richness of the soil in some measure determines the feeding value of the turnip, and the richness of the soil depends among other things upon the kind of manure which is applied to it. One object of these experiments is to discover how the various substances which are used in making turnip manures affect the feeding value of the crop.

Albuminoid matter is not the only nitrogenous constituent of turnips. There are also nitrates, and other nitrogenous substances less complex than albumen, which are found in various proportions in different turnips. In estimating the feeding value of turnips, it is with the albuminoid matter that we are concerned, and not with the other nitrogenous materials, and we must therefore use some means of estimating the albuminoid nitrogen apart from the nitrogen of the non-albuminoid substances. There are various good methods, and it matters little which we employ, so long as we adhere to the same method throughout. The method used in this case was the "carbolic acid method" proposed by Church. When turnip matter is allowed to steep for some time in aqueous carbolic acid, the albuminoid matter coagulates and becomes insoluble in water, so that all nitrogenous matter of a non-albuminoid kind may be washed away from it. The nitrogen in the coagulated albumen is determined by combustion with soda lime. In order to obtain an estimate of the amount of non-albuminoid nitrogen, a combustion was made of all the samples before as well as after treatment with carbolic acid. The results are given on Table XI. In the first column of the table is given the total nitrogen in the turnip, and in the second the albuminoid nitrogen, and the difference between these two shows how much non-albuminoid nitrogen there is in the turnips. This ranges from less than one-tenth to nearly one-quarter of the whole nitrogen, so that on an average of the whole station, while there is sufficient nitrogen to account for 9 per cent. of albuminoid matter, there is realy only $7\frac{1}{2}$ per cent. of real albuminoid matter in the dry matter of the crop.

This is a very low result, but it corroborates that obtained with the former turnip crop on Pumpherston. The seed sown was of the same kind on both occasions, and perhaps the kind of seed has something to do with the result.

No. XI.—Albumen in Dry Matter of Turnips—Pumpherston.

No. of Plot.	Manures.	Manures applied in January.				Manures applied in May.			
		Nitrogen.		Albumen.		Nitrogen.		Albumen.	
		Total.	Albuminoid.	Per cent.	Per acre.	Total.	Albuminoid.	Per cent.	Per acre.
	Phosphatic Manures.	per cent.	per cent.		lbs.	per cent.	per cent.		lbs.
1	Bone ash,	1·13	1·02	6·45	212	1·60	1·16	7·31	222
2	Do. dissolved,	1·45	1·08	6·83	246	1·41	1·10	6·96	198
3	Ground coprolites,	1·48	1·14	7·21	204	1·57	1·19	7·53	222
4	Do. dissolved,	1·28	1·07	6·75	226	1·12	1·00	6·33	205
5	Bone Meal,	1·32	1·05	6·64	195	1·39	1·09	6·90	183
6	Do. dissolved,	1·43	1·09	6·90	227	1·37	1·10	6·96	211
7	Phosphatic guano,	1·30	1·11	7·00	202	1·44	1·20	7·59	205
8	Do. do. dissolved,	1·23	1·03	6·51	232	1·35	1·12	7·08	260
9	Ground Charleston phos.,	1·66	1·40	8·86	209	1·77	1·38	8·73	240
10	Do. do. dissolved,	1·41	1·23	7·76	281	1·54	1·22	7·75	260
11	No phosphate,	1·80	1·45	9·17	145	1·78	1·43	9·05	151
12	Bone ash alone, ...	1·27	1·17	7·40	143	1·11	0·95	6·01	129
	Nitrogenous Manures.								
13	Nitrate of soda,	1·57	1·38	8·73	258	1·55	1·24	7·86	221
14	Sulphate of ammonia,	1·31	1·22	7·72	224	1·37	1·28	8·10	222
15	Dissolved shoddy,	1·37	1·19	7·53	227	1·29	1·00	6·37	129
16	Dried blood,	1·23	1·27	8·02	210	1·25	1·12	7·18	194
17	No nitrate,	1·62	1·49	9·43	134	1·54	1·28	8·13	104
18	Nitrate of soda alone, ...	1·39	1·26	8·00	199	1·37	1·24	7·86	216
	Potassic Manures.								
19	Sulphate of potash,	1·72	1·23	7·79	248	1·52	1·29	8·16	217
20	Muriate of potash,	1·43	1·34	8·48	223	1·41	1·26	7·97	217
21	No potash,	1·56	1·23	7·81	207	1·31	1·11	7·02	106
22	Potash salts alone, ...	1·20	1·07	6·77	96	1·34	1·13	7·15	100
	Guanos.								
23	Peruvian guano, ...	1·26	1·18	7·47	243	1·39	1·25	7·91	228
24	Fish do., ...	1·43	1·22	7·75	150	1·35	1·12	7·12	161
25	Ichaboe do., ...	1·42	1·39	8·79	197	1·35	1·20	7·62	184
26	Unmanured since 1879, ...	1·39	1·25	7·90	155	1·40	1·26	7·97	154
27	Unmanured, ...	1·58	1·23	7·78	147	1·58	1·28	8·10	154
	Superphosphates.								
28	10% Soluble phosphate,	1·71	1·41	8·92	251	1·83	1·45	9·18	240
29	25% Do. do.,	1·72	1·39	8·80	292	1·71	1·37	8·67	209
30	40% Do. do.,	1·70	1·37	8·68	228	1·67	1·40	8·92	177
	Average, ...			7·79	207			7·65	190

With nitrate of soda and potash salts,

With superphosphate and potash salts,

With superph. and nitrate of soda,

With sulph. of ammonia and potash salt,

Owing to the smallness of the scale on which the former analysis was made, and the unfavourable character of the season, I did not feel justified in attaching much importance to the

No. XII.—Albumen in Dry Matter of Turnips.—Harelaw.

No. of Plot.	Manures.	Manure applied in January.		Manure applied in May.	
		Albumen.	Albumen.	Albumen.	Albumen.
		Per cent.	Per acre.	Per cent.	Per acre.
	Phosphatic Manures.		lbs.		lbs.
1	Bone ash,	7·72	312	8·19	354
2	Do. dissolved,	7·47	321	7·40	305
3	Ground coprolites,	6·62	273	6·68	272
4	Do. dissolved,	6·81	317	6·55	283
5	Bone meal,	7·34	305	6·82	285
6	Do. dissolved,	6·14	271	7·07	290
7	Phosphatic guano,	7·79	340	7·09	300
8	Do. do. dissolved,	7·34	332	7·40	311
9	Ground Charleston phos.,	7·03	277	7·37	286
10	Do. do. dissolved,	7·98	363	7·28	303
11	No phosphate,	8·68	366	7·98	301
12	Bone ash alone,	6·94	289	7·60	306
	Nitrogenous Manures.				
13	Nitrate of soda,	8·03	383	8·48	381
14	Sulphate of ammonia,	7·23	356	7·89	381
15	Horn dust,	6·75	362	8·29	352
16	Dried blood,	6·34	271	5·89	247
17	No nitrogen,	6·84	332	6·78	300
18	Nitrate of soda alone,	8·37	352	7·81	345
	Potassic Manures.				
19	Sulphate of potash,	8·82	414	8·57	390
20	Muriate of potash,	7·40	339	7·30	314
21	No potash,	9·33	417	9·08	405
22	Potash salts alone,	6·61	310	7·34	358
	Guanos.				
23	Peruvian guano,	7·84	358	7·72	360
24	Fish do.,	7·98	307	7·98	385
25	Ichaboe do.,	6·68	329	6·74	306
26	Unmanured since 1879,	6·93	280	7·00	278
27	Unmanured,	6·36	265	6·66	271
	Superphosphates.				
28	10% Soluble phosphate,	8·68	406	8·67	371
29	25% Do. do.	8·32	410	8·50	346
30	40% Do. do.	8·38	364	8·51	347
	Average,	7·49	340	7·56	324

With nitrate of soda and potash salts, (1–11)

With superphosphate and potash salts, (13–18)

With superph. and nitrate of soda, (19–22)

With sulph. of ammonia and potash salts, (28–30)

results then obtained; but on this occasion the analysis has been carried out on an enormous scale, and the average obtained is derived from the analysis of 120 samples, so that there is no

doubt about the proportion of albuminoid matter contained in these turnips. It shows that turnips may form a very poor diet, and that though there are turnips containing 1 per cent. of albuminoid matter, there are also some which contain only three-quarters of that amount or less. There is a considerable range in the proportion of albuminoid, and there is some connection between the manuring and the amount of albumen. Thus it will be seen, on comparing the soluble and insoluble phosphate plots (Tables XIII. and XIV.), that the percentage of albumen is less where soluble phosphates are applied. There are several advantages to be gained by the use of superphosphate rather than ground phosphates, but it would seem that the growing of plants rich in albumen is not one of them. We have seen that they may increase the amount of the crop, and that they increase the proportion of ash, but it is evident from the result obtained at both stations, that they decidedly diminish the proportion of albuminoid matter. This is a very unfortunate result, for of all the constituents of a turnip, the albumen is the most important one from a feeding point of view, and it is just possible that the advantages above referred to may be bought at too dear a price, if the proportion of albumen is seriously diminished. It will be seen that the diminution of albumen is not sufficient to counteract the gain from the total increase of weight, but the amount of albuminoid matter produced per acre on the dissolved phosphate plots is not by any means so great as we should expect from the gross gain in the weight of the crop. This is a matter which cannot be definitely determined by analysis, but it is an important one, and it deserves to be tested by actual feeding experiments.

From the data now before us, we are able to calculate the remaining portion of turnip matter. It consists of carbohydrates and oil, and these make up the great bulk of the solid matter of turnips. About three-quarters of the solid matter consist of these constituents, but the latter is there in very small amount, so small as to make it unnecessary to estimate it separately unless for special purposes.

In the following table (XV.) the oil is included with the carbohydrates, and the ratio between the albumen and carbohydrates is given, the albumen being considered as 1 per cent. The average ratio may be taken as 1 : 10, that is, one of albumen to ten of carbohydrates, &c., contained in the dry matter of the turnip. One to ten is a wide ratio, and indicates a poor feeding material. It will be seen, however, that there is a considerable range in these ratios, and that a closer ratio, such as 1 : 8·5 is not uncommon. The closer the ratio the better the feeding quality, and it is evident that the turnips grown on some of these plots would have formed a more nutritious diet than those grown upon

No. XIII.—Pumpherston.

Undissolved Phosphates.

No. of Plot.	Manures.	Manured in January.		Manured in May.	
		Albumen per cent.	Albumen per acre.	Albumen per cent.	Albumen per acre.
			lbs.		lbs.
1	Bone ash,	6·45	212	7·31	222
3	Ground coprolites,	7·21	204	7·53	222
5	Bone meal,	6·64	195	6·90	183
7	Phosphatic guano,	7·00	202	7·59	205
9	Charleston phosphate,	8·86	209	8·73	240
	Average,	7·23	204	7·61	214
	Dissolved Phosphates.				
2	Bone ash,	6·83	246	6·96	198
4	Ground coprolites,	6·75	226	6·33	205
6	Bone meal,	6·90	227	6·96	211
8	Phosphatic guano,	6·51	232	7·08	260
10	Charleston phosphate,	7·76	281	7·75	260
	Average,	6·97	242	7·01	227

No. XIV.—Harelaw.

Undissolved Phosphates.

No. of Plot.	Manures.	Manured in January.		Manured in May.	
		Albumen per cent.	Albumen per acre.	Albumen per cent.	Albumen per acre.
			lbs.		lbs.
1	Bone ash,	7·72	321	8·19	354
3	Ground coprolites,	6·62	273	6·68	272
5	Bone meal,	7·34	305	6·82	285
7	Phosphatic guano,	7·79	340	7·09	300
9	Charleston phosphate,	7·03	277	7·37	286
	Average,	7·30	301	7·23	299
	Dissolved Phosphates.				
2	Bone ash,	7·47	321	7·40	305
4	Ground coprolites,	6·81	317	6·55	283
6	Bone meal,	6·14	271	7·07	290
8	Phosphatic guano,	7·34	332	7·40	311
10	Charleston phosphate,	7·98	363	7·28	303
	Average,	7·15	321	7·14	298

others. It will be seen that the ratio is closest on these plots which produced a small crop, and that the ratio widens very regularly, according as the quantity of solid matter per acre increases. The increase of quantity thus seems to be got at the expense of quality, and that what is called a poor crop is nevertheless, ton for ton, better feeding matter than a large one. A small crop should therefore fetch a higher price per ton than a bulky one. The phosphate plots which produced large crops have a wide ratio, and those to which soluble phosphate was applied have the widest ratio of all. The only plot which contains a small crop with a wide ratio is plot 22,—an abnormal plot in many respects,—which received nothing but potash salts. The superphosphate plots 28, 29, and 30 are nearly on a level as regards feeding quality, but with the exception of the winter-manured half of plot 29, the crop was below average in quantity. It will be noticed, however, that all these plots have a comparatively close ratio, and the produce of them was better than the rest of the station if we have regard to both the quantity and quality combined. The main difference in the manuring between these plots and the others is, that instead of being top-dressed with nitrate of soda, they had sulphate of ammonia applied to them; and it may be that nitrogen supplied in the latter form is better than the other for the production of quality in turnips, but it would be rash to assert this without further proof than is afforded by this one set of experiments. It is an indication, however, which will receive investigation immediately. The results of these analyses sufficiently show that there are other things than manuring to consider in aiming at quality in turnips, and chiefly there is the seed. Other experiments, which I have been carrying on for some years, show that with proper selection of seed there is a possibility of improving the strain of turnips in the direction of increasing their feeding quality, and it seems evident that this is a matter in which we have hitherto been too careless. There seems no reason why the feeding power of turnips should not be greatly increased—perhaps doubled—by a careful selection of seed from the most nutritious bulbs.

The "Quantity plots" (31–34) form a very instructive group at Pumpherston station. These plots are duplicates of plots 1, 2, 4, and 20, and have the same gross quantity of manure applied to them, but they are each divided in half. The manure for them was divided into three equal portions; to one half of each plot one portion was given and to the other half two portions. The one half of each plot received exactly half the amount of manure which the other half did. In comparison with the plots of which they are duplicates, the one half received one-third less manure, and the other received one-third more. The differences in the amount of crop are very striking—much

No. XV.—*Pumpherston.*

Ratio of Albumen to Carbohydrates in Dry Matter of Turnips.

No. of Plot.	Manures.		Manured in January.			Manured in May.		
			Albumen.	Carbohydrates, &c.	Ratio.	Albumen.	Carbohydrates, &c.	Ratio.
	Phosphatic Manures.		Per cent.	Per cent.		Per cent.	Per cent.	
1	Bone ash,		6·45	76·9	1 : 11·9	7·31	76·3	1 : 10·6
2	Do. dissolved,		6·83	75·1	1 : 11·0	6·96	76·8	1 : 11·0
3	Ground coprolites,		7·21	75·2	1 : 10·4	7·53	77·1	1 : 10·2
4	Do. dissolved,		6·75	75·7	1 : 11·2	6·33	77·5	1 : 12·2
5	Bone meal,	With nitrate	6·64	76·3	1 : 11·5	6·90	78·2	1 : 11·3
6	Do. dissolved,	of soda and	6·90	75·8	1 : 11·0	6·96	76·9	1 : 11 0
7	Phosphatic guano,	potash salts,	7·00	73·5	1 · 10·7	7·59	75·0	1 : 9·8
8	Do. do. dissolved,		6·51	75·3	1 : 11·5	7·08	76·7	1 : 10·8
9	Ground Charleston phos.		8·86	73·3	1 : 8·3	8·73	74·5	1 : 8·5
10	Do. do. dissolved,		7·76	75·4	1 : 9·6	7·75	75·9	1 : 9·8
11	No phosphate,		9·17	70·5	1 : 7·8	9·03	73·3	1 : 8·1
12	Bone ash alone, ...		7·40	77·1	1 : 10·4	6·01	78·0	1 : 11·3
	Nitrogenous Manures.							
13	Nitrate of soda,		8·73	74·8	1 : 8·5	8·86	74·6	1 : 8·4
14	Sulphate of ammonia,	With super-	7·72	76·5	1 : 9·9	8·10	76·0	1 : 9·3
15	Dissolved shoddy,	phosphate and	7·53	74·9	1 : 9·9	6·87	75·4	1 : 10·9
16	Dried blood,	potash salts,	7·02	75·8	1 : 10·8	7·18	75·9	1 : 10·5
17	No nitrogen,		9·43	71·6	1 : 7·6	8·73	73·4	1 : 8·4
18	Nitrate of soda alone, ...		8·23	76·6	1 : 9·3	7·86	74·0	1 : 9·4
	Potassic Manures.							
19	Sulphate of potash,	With superph.	8·79	74·0	1 : 8·4	8·16	74·2	1 : 9·0
20	Muriate of potash,	and nitrate of	8·48	74·1	1 : 8·7	7·97	74·3	1 : 9·0
21	No potash,	soda,	7·81	72·6	1 : 9·3	7·02	72·5	1 : 10·3
22	Potash salts alone, ...		6·77	77·7	1 : 11·5	7·15	78·1	1 : 10·9
	Guanos.							
23	Peruvian guano, ...		7·47	74·7	1 : 10·0	7·91	74·2	1 : 9·4
24	Fish do., ...		7·75	73·8	1 : 8·6	7·12	74·7	1 : 10·4
25	Ichaboe do., ...		8·79	74·7	1 : 8·2	7·62	77·3	1 : 10·1
26	Unmanured since 1879, ...		7·90	76·7	1 : 9·7	7·97	75·7	1 : 9·5
27	Unmanured, ...		7·78	74·7	1 : 9·6	8·10	74·2	1 : 9·1
	Superphosphates.							
28	10% Soluble phosphate,	With sulp. of	8·92	73·5	1 : 8·3	8·58	73·8	1 8·6
29	25% Do. do.,	ammonia and	8·80	75·6	1 : 8·6	8·67	75·1	1 : 8·6
30	40 Do. do.,	potash salts,	8·68	74·9	1 : 8·6	8·92	75·0	1 : 8·4

more so than they have been in any previous year. The details are as follows:—

No. XVI.—Quantity Plots—Pumpherston.

No. of Plot.	Quantity of Manure compared with Normal Plots.	Winter Manuring.		Spring Manuring.		Total per acre.		Duplicate Plots per acre.
		$\frac{2}{3}$	$\frac{4}{3}$	$\frac{2}{3}$	$\frac{4}{3}$	$\frac{2}{3}$	$\frac{4}{3}$	Normal Manure.
		cwt. qr.	cwt. qr.	cwt. qr.	cwt. qr.	ton cwt.	ton cwt.	ton cwt.
31	Duplicate of Plot 1	10 0	23 1	9 1	24 0	7 14	18 18	16 3
32	,, ,, 2	11 0	31 1	11 3	24 3	9 2	22 8	17 0
33	,, ,, 14	10 1	23 2	10 3	27 0	8 8	20 4	13 19
34	,, ,, 20	11 0	30 2	13 2	22 1	9 16	21 2	14 11
	Average, .	10 2	27 0	11 1	24 2	8 15	20 13	15 8

The half with one-third less than the normal quantity of manure has given an exceedingly poor crop, and the winter application has done worst. The half with one-third more than the normal manure has yielded more than double the crop of the other, and in this case the advantage lies with the winter manuring. When these results are compared with those obtained on the plots of which they are duplicates, and which received the normal quantity of manure, the relation between the quantity of manure and the crop becomes very apparent. The two-thirds manure crop is a failure and a loss; the three-thirds or normal manure shows an enormous increase, quite disproportionate to the amount of manure added. The manure was increased by one-third and the crop has increased by more than two-thirds; instead of 8 tons 15 cwt. there is obtained an average of 15 tons 8 cwt. per acre. When four-thirds the normal manure is applied another great increase is observed; the crop is raised to 20 tons 13 cwt. on an average. The first increment of manure raised the crop 6 tons 13 cwt. per acre, the second increment raised it 5 tons 5 cwt. per acre, and had there been a third and a fourth increment of manure there would have been a further though of course smaller and smaller increase in the weight of crop. By means of a simple experiment such as this we are able to discover what is the amount of manure which can be most profitably applied in growing a crop of turnips. In this case the average price of the manure applied would be about £3 per acre. We may therefore put the cost of manure against the crop thus—

	Price of Manure per acre.	Crop per acre.
	£ s. d.	Tons. cwt.
Unmanured, . .	...	8 0
$\frac{2}{3}$ manure, . .	2 0 0	8 15
$\frac{3}{3}$ manure, . .	3 0 0	15 8
$\frac{4}{3}$ manure, . .	4 0 0	20 13

It is evident that, by the expenditure of £2 per acre, there is no profit, but a loss of £2, for the crop is comparable with that of the plots which received nothing at all. When £3 per acre is spent on manure, 6½ tons of turnips are got for it; that is, an average cost for manure of about 9s. per ton of turnips. When £4 per acre is spent on manure, nearly 12 tons per acre of turnips are got for it, or an average cost of fully 6s. 6d. per ton. It is probable that had another 20s. per acre been spent on the manure of these turnips, the average produce would have amounted to from 24 to 25 tons per acre; that is, about 16½ tons increase for £5 spent on manure, making the cost a little below 6s. 6d. per ton. Any further increase of manure would have produced only a small increase of turnips, if any, and it is evident that we have reached the limit of profitable manuring when we apply one and two-thirds the amount of manure we are putting upon these turnips. That is to say, it would pay best to spend £5 per acre in turnip manure of the kind we are applying for Pumpherston station; and if it did not pay to spend £5 per acre, it would not pay to grow turnips there at all, for turnips can be grown cheaper at a cost of £5 per acre for the manure we are using, than they can be grown at any less manurial expenditure.

For every soil and system of manuring, there is a point beyond which it is unprofitable to go in the application of manures, and that is a point *short of which it is unprofitable to stop*. It is as easy to underdo, as it is to overdo the manure expenditure, and the temptation to the former is very great. What that point is every farmer who grows turnips must discover for himself, and an experiment, such as the one here described, is one that should be practised by every farmer in the country.

BARLEY CROP, 1883.

Owing to the extreme severity of the winter of 1882–3, and the consequent delay in securing the turnip crop, it was impossible to repeat the experiment of a winter and spring manuring with the succeeding crop of barley. There was, however, an experiment of a similar kind, which it seemed desirable to try as regards the application of a top-dressing. The system of manuring at the stations was favourable for making an experiment of that kind, for a large number of the plots annually receive their nitrogenous manure in the form of nitrate of soda, and accordingly it was determined to try what were the relative effects produced by a late and an early top-dressing of this manure. For this purpose the plots receiving nitrate were cut in two as in the previous year, and to the half which had received the winter-manuring for turnips, the whole manure was applied along with the barley seed in April, while to the other half the same manure were applied, with the exception of the nitrate of soda. This constituent was withheld until the braird was far enough advanced to make use of it. In ordinary seasons this would have been about a month after the date of sowing, but owing to extreme drought the seed was slow in germinating. It was not until about the middle of May that the first braird was seen at Pumpherston, and it was fully a week later before the more backward plots could be said to have established their braird. The success or otherwise of top-dressing depends greatly upon the rainfall, and the amount and distribution of the rainfall during the time the crop was growing requires to be noted, in order that the effects of the early and late application of nitrate of soda may be properly interpreted. The following is the record of the rainfall at Pumpherston, from the date of sowing onwards :—

Rainfall.	Inches.	No. of Days on which Rain fell on Barley.
April, 23rd to 30th, .	1·07	3
May, ...	1·55	7
June, ...	2·44	9
July, ...	4·98	16
August, . . .	3·15	8
Total,	13·15	43

This carefully kept record shows that the season was altogether

an exceptional one. Not only is the total rainfall very high, but it is distributed in a manner which is the converse of that of normal seasons. Instead of July being the driest month, it was the wettest. It rained more than half the time, and attained the extraordinary record of almost 5 inches. It is needless to say that this had a very marked influence upon the barley crop, and unfavourably affected the whole of the experiments, but especially that part which was designed to exhibit the relative advantage of early and late top-dressing.

Had the rainfall of July and August been interchanged with that of May and June, the results would have been entirely different. Owing to the drought in May, the braird remained nearly stationary for weeks, and the half-plots which had received nitrate of soda were no better than those from which it had been withheld. It was evident that the manures had not begun to tell upon the crop, and it was determined to delay the application of nitrate to the remaining half-plots until the effect of the first application was visible. This did not occur until the middle of June. After the occurrence of two or three days of wet weather, the greener and more vigorous appearance of the parts where the nitrate had been applied, showed that that manure was having its effect, and the remaining half plots were immediately top-dressed. There was thus seven weeks of an interval between the first and second application of nitrate, instead of three and four weeks, as would have been the case in a normal season. Had the season continued to be a dry one, this interval would probably not have been too great, but the occurrence of extremely wet weather in July brought about a state of matters which could not have been anticipated. The crop which had remained for weeks in a dormant state now shot away at a great rate, and the half which had received the late top-dressing rapidly overtook its rival, and in the end surpassed it in length of straw by 6 or 8 inches. During the first week of August the crop looked beautiful, and the difference between the late and early top-dressing could be seen distinctly three miles off. A few days later there occurred the memorable storm of the 9th August, which made such havoc of the woods and plantations all over the country, and the crops at both stations, in common with most of the corn corps in the neighbourhood, were very much laid. The parts which were late top-dressed suffered most, for on them the straw was long and slender and thickly grown, and no doubt it was of a weaker constitution than that on the other plots. Accordingly large breadths of it were laid flat or twisted about in a great confusion, and the hopes of obtaining a fine crop and much reliable information were rudely dissipated. The storm occurred at an unfortunate time, for the crop was still growing, and the various

No. XVII.—Barley Crop, 1883.

Harelaw.

No. of Plot.	Manures.	Dressed Grain. Bushels per acre.	Dressed Grain. Weight per bushel.	Light Grain per acre.	Total Grain. Per acre.	Straw per acre.
			lbs.	lbs.	lbs.	cwt.
	Phosphatic Manures—					
1	Bone ash,	64·1	53¾	212	3657	26
2	Do. dissolved,	69·3	53½	160	3867	20
3	Ground coprolites,	66·7	53½	272	3840	24
4	Do. dissolved,	66·7	53½	220	3790	28
5	Bone meal,	61·1	54¼	172	3486	26
6	Do. dissolved, } With nitrate of soda and	61·1	54	236	3535	25
7	Phosphatic guano, potash salts,	65·3	53	216	3677	26
8	Do. do. dissolved,	70·6	52¾	220	3944	28
9	Ground Charleston phos.,	66·1	53¼	220	3740	26
10	Do. do. dissolved,	63·0	53¾	372	3758	26
11	No phosphates,	65·3	53½	200	3693	24
12	Bone ash alone, ...	48·2	55¼	116	2779	20
	Nitrogenous Manures—					
13	Nitrate of soda,	56·8	54	244	3311	20
14	Sulphate of ammonia, With super-	60·0	54½	204	3474	20
15	Dissolved shody, phosphate and	48·7	55¾	132	2847	18
16	Dried blood, potash salts,	57·2	55½	136	3311	20
17	No nitrogen,	50·1	56	220	3026	18
18	Nitrate of soda alone, ...	65·7	53½	232	3747	24
	Potassic Manures—					
19	Sulphate of potash, With superph.	66·0	52¼	264	3712	22
20	Muriate of potash, and nitrate of	65·0	53¼	40	3461	24
21	No potash, soda,	60·7	53½	400	3647	22
22	Potash salts alone, ...	50·8	56	196	3041	20
	Guanos—					
23	Peruvian guano, ...	59·4	55½	200	3497	22
24	Fish do., ...	63·8	55¼	220	3745	24
25	Ichaboe do., ...	61·3	54½	192	3533	24
26	Steamed bone meal, ...	62·0	54	164	3512	26
27	Unmanured, continuously, . . .	42·7	55½	164	2534	20
	Superphosphates—					
28	10% Soluble phosphate, With nitrate	60·7	54	268	3546	26
29	25% Do. do., of soda and	66·6	53½	252	3815	26
30	40% Do. do., potash salts,	65·9	53¾	248	3790	26
31*a*	Duplicate of Plot 1 (⅔ manure), . .	54·7	54½	216	3197	28
31*b*	Do. do. 1 (⅓ do.), . .	63·3	53½	336	3722	28
32*a*	Do. do. 2 (⅔ do.), . .	60·7	55	280	3618	24
32*b*	Do. do. 2 (⅓ do.), . .	66·8	54	296	3903	28
33	Calcined fossil phosphate, . . .	56·5	56	164	3328	25
34	Fray Bentos guano, ...	55·0	55¼	121	3160	24
35*a*	Rape dust, ...	55·0	55	384	3409	24
35*b*	Cotton cake dust, ...	61·5	55¼	304	3702	25
36	Unmanured (formerly $\frac{1}{11}$ acre plots), .	54·5	54	240	3183	26
37	Unmanured, ...	40·7	55¾	144	2413	19
38	Superphosphate, ...	64·2	53	224	3627	28
39	Unmanured, ...	46·0	55	144	2674	20
40	Do., ...	38·0	55¼	140	2239	18

No. XVII.—Barley Crop, 1883.

Pumpherston.

No. of Plot.	Top-dressed in April.					Top-dressed in June.				
	Dressed Grain.		Light Grain per acre.	Total Grain per acre.	Straw per acre.	Dressed Grain.		Light Grain per acre.	Total Grain per acre.	Straw per acre.
	Bushels per acre.	Weight per bushel.				Bushels per acre.	Weight per bushel.			
		lbs.	lbs.	lbs.	cwt.		lbs.	lbs.	lbs.	cwt.
1	38·7	54½	96	2205	33	40·6	52½	232	2363	36
2	40·2	54½	88	2279	33	42·8	53½	128	2418	36
3	32·7	54	176	1942	33	38·2	51½	240	2207	37
4	41·0	54½	56	2290	33	45·3	53	200	2601	36
5	41·5	54½	72	2334	35	42·6	53	208	2466	33
6	42·9	55	40	2399	40	49·1	53	144	2746	38
7	43·5	52½	120	2404	32	43·5	52	208	2470	39
8	46·2	54	232	2727	33	44·6	52½	344	2685	38
9	37·7	52½	192	2171	36	35·7	52	192	2048	36
10	48·9	53	144	2736	39	52·3	52½	184	2930	36
11	29·9	54	200	1814	30	30·1	53½	240	1850	30
12	19·9	53	120	1175	16					
13	44·9	55½	104	2596	32	42·9	54	312	2629	34
14	44·0	56	296	2760	30					
15	27·7	55½	48	1585	19					
16	44·3	54½	68	2482	26					
17	23·1	53	32	1256	16					
18	21·7	51	180	1287	22					
19	48·9	54½	96	2761	33	46·3	52	160	2567	30
20	42·9	53	112	2386	27	47·0	54	144	2682	29
21	28·2	50	296	1706	24	22·5	49	608	1710	28
22	14·7	53	96	875	10					
23	34·2	55	72	1953	22					
24	32·3	53	112	1824	19					
25	35·0	43½	68	1940	23					
26	36·6	52½	144	2065	24					
27	15·6	51	144	909	12					
28	43·7	53	160	2476	31	33·8	51	280	2004	31
29	46·1	54	88	2577	33	41·3	53½	296	2505	36
30	45·5	53	208	2619	32	35·8	51½	352	2196	32
31*a*	25·5	53	192	1543	29					
31*b*	40·0	51½	352	2412	40					
32*a*	33·0	53	256	2005	32					
32*b*	49·3	53½	224	2861	44					
33	31·0	53	104	1747	27					
34	37·0	53	82	2043	30					
35*a*	33·5	54	64	1873	22					
35*b*	37·0	55	48	2083	24					
36	41·0	54	138	2352	32					
37	21·0	53	104	1217	16					
38	42·2	55	212	2533	33					
39	76·5	51¾	91	944	13					
40	16·0	51¾	100	927	13					

plots were in very different stages of advancement, and it was evident that the ears of corn on the later plots would not get a chance of filling and ripening properly.

To add to the mischief done on the 9th, there occurred four days later a renewal of the storm, accompanied by heavy rain, so that during twenty-four hours on the 13th August a rainfall of 1·66 inches was registered. The effect of this was not only to beat down still further the fallen corn, but to cause it to stock out afresh, and on the plots most battered a large undergrowth of weak slender plants made its appearance.

Altogether the season of 1883 was very unfavourable to the barley crop, for, besides the excessive rainfall, the weather was cold and sunless. The mean daily maximun temperature at Pumpherston during May was 57° F., and on seven nights there were from 1° to 8° of frost. The mean daily maximum temperature in June was 50° F., in July 67° F., and in August 63° F.

The state of matters at Harelaw was very similar to the above, but as the crop was much heavier the effects of the storm were even more disastrous on the late manured parts of that station. It was evident that no information could be obtained there regarding the relative value of early and late top-dressings, and in the harvesting this distinction was not maintained, but each plot was cut as a whole.

The crop at Harelaw was chevalier barley, and that at Pumpherston common barley.

Table XVII. gives the details of the crop at both stations.

Regarding the crop at Harelaw very little comment is necessary. The yield per acre over the whole is tolerably uniform, except on the plots where one or more ingredients of the manure are omitted. On so fertile a soil the differences between the plots receiving equivalent amounts of manure could only be slight at the best, but the effect of the storm was to act as a leveller of distinctions, for the plots where the growth was heaviest were precisely those which were most battered down, and thus the lighter plots had an opportunity of improving their relative position. On the poorer soil of Pumpherston the same disturbance occurred, but there the differences were too great to be obliterated, and the results of the cropping there indicate plainly enough the relative advantages of the various kinds of manures.

The half-plots to which the late top-dressing was applied were kept distinct, and the results are given on the right hand side of the table. The differences of the numbers on the two sides of the table are very striking. It is evident that the effect of delaying the application of nitrate of soda until the month of June has been to produce a bulkier crop both in grain and straw, and there can be no doubt that if the corn had been allowed to

mature without damage the advantage of late top-dressing, in that respect, would have been still more apparent. It will be seen, however, that the advantage in respect of *quantity* of grain is got at the expense of *quality*, for the weight per bushel of the heavier crop is decidedly inferior, and the proportion of light grain is enormously increased. It may be that late top-dressing, even in the most favourable circumstances, has the effect of producing an inferior quality of grain, and a greater proportion of light grain, but that is by no means proved by these experiments. It has been already explained that the damage done by the storm was most felt in that part of the stations where the bulk was greatest, and the sudden check which was given to the growth of that part of the crop would have the direct effect of preventing the filling of the ears, especially when it is remembered that one of the effects of late top-dressing is the retarding of the time of ripening. Had the second top-dressing been applied about three weeks later than the first, as it would have been in a normal season, very little difference in the time of ripening would have occurred; but as more than double that time elapsed between the two applications of nitrate, it was noticed that the late manured section was still green when a yellow tinge was apparent over the rest of the station. Accordingly, when the storm came on a large amount of the nourishment stored up in the roots of the late manured corn had not yet been carried up into the stem, and its progress in that direction was checked when the stem was broken over. This nutritive matter was thus prevented from adding to the weight of the ears already formed, and expended itself in the formation of a puny second growth, which, running to seed, greatly augmented the amount of light grain. It is highly probable that if the crop had been allowed to mature without accident, the later manured section would have produced as heavy a quality of grain as the other, and perhaps in even greater abundance. This is undoubtedly a subject well worthy of investigation, and it will receive careful attention at the first opportunity. The relative quantity and quality on the two sides of the table are thus found to compensate each other in some measure, so that when we consider the total weight of grain and of straw, the differences due to the early and late top-dressings are not so striking as at first sight they appear. It is to the two columns containing the total weights of grain and straw per acre that we must direct our attention in estimating the relative efficacy of the various forms of manure.

In the first place as regards phosphates, it will be seen on comparing the results of the ground phosphate with those of the dissolved phosphate plots, that the advantage remains with the latter, despite the levelling effects of the storm. They have

No. of Plot.	Manures.	*Pumpherston.*				*Harelaw.*	
		Top-dressed in April.		Top-dressed in June.			
		Total Grain.	Straw.	Total Grain.	Straw.	Total Grain.	Straw.
		lbs.	cwt.	lbs.	cwt.	lbs.	cwt.
	Ground Phosphates—						
1	Bone ash, ...	2205	33	2363	36	3657	26
3	Ground coprolites, . .	1942	33	2207	37	3840	24
5	Bone meal, ...	2334	35	2466	33	3486	26
7	Phosphatic guano, . .	2404	32	2470	39	3677	26
9	Ground mineral phosphate, .	2171	36	2048	36	3740	26
	Average, .	2211	33·8	2311	36·2	3680	25·6
	Dissolved Phosphates—						
2	Bone ash, ...	2279	33	2418	36	3867	20
4	Ground coprolites, . .	2290	33	2601	36	3790	28
6	Bone meal, ...	2399	40	2746	38	3535	25
8	Phosphatic guano, . .	2727	33	2685	38	3944	28
10	Ground mineral phosphate, .	2736	39	2930	36	3758	26
	Average, .	2486	35·6	2676	36·8	3779	25·4

produced 13 per cent. more grain at Pumpherston, and about 3 per cent. more grain at Harelaw. There is on the whole very little difference in the weight of straw. The late top-dressing has produced a heavier crop than the early one, both in grain and straw. As regards the individual phosphates, it would scarcely be prudent, in the exceptional circumstances of the crop, to examine them too narrowly. The most notable thing to remark is the good crop on the bone meal plot. When the experiments began this was the most backward of all the phosphate plots, but it has been going on steadily improving its position from year to year. There are two reasons for this. In the first place, the coarser particles of the meal employed in former years are still in the soil, and slowly decomposing, so that the roots of the crop are feeding partly upon phosphate which should have been used by former crops; and in the second place, the bone meal now being manufactured is much finer than anything that could be got a few years ago; and it is to be expected that the bone meal plot will continue to improve for some time to come.

Among the nitrogen plots at Pumpherston, it will be observed that plot 14, which received sulphate of ammonia, has yielded the largest return, and the quality of the grain on that plot is the best on the station. Plot 13, with nitrate of soda, comes very near it, and has the advantage in straw. Dried blood has also proved a good manure, but it has not produced much straw. Dissolved shoddy has given a poor return, and no more straw

than plot 17, which got no nitrogenous manure. Of the two forms of potash manure the sulphate is the best, but the muriate, with a late top-dressing of nitrate, has done very well. Among the guanos the differences are less than in former years. The fish guano plot is steadily improving, for the same reason as the bone meal one above referred to. The results upon the superphosphate plots resemble on the whole those of the former years; the 25 per cent. soluble superphosphate is the best, but the more highly dissolved one would probably have been quite as good if it had not been so much damaged by the storm.

The plots with incomplete manures are every year showing their respective wants more and more markedly. The great want of the soil is nitrogen. Phosphate alone produces a poor crop, and potash alone is worse than nothing; while nitrate of soda alone is yearly becoming less efficacious, showing that the small store of mineral food in the soil is rapidly becoming exhausted.

The quantity plots tell the same story as in former years, but not so remarkably as formerly, for the heavier manured plots were very severely hurt by the wind and rain.

Three new manures were applied to the crop, viz., plot 26, steamed bone flour; plot 33, calcined fossil phosphate; and plot 34, Fray Bentos guano. The first and last of these have shown themselves to be good manures, but it would be premature to classify them from the results of a season so exceptional. They will be applied again to the bean crop this year, along with other forms of manure of animal origin, which are now coming into the market.

ANALYTICAL ASSOCIATIONS.

By Dr A. P. Aitken.

At the General Meeting in January, of which a report is given in Appendix A, p. 17, it was shown in the Report of the Chemical Department that a great improvement had taken place in the character of the manures supplied to local analytical associations since the Society began to take an interest in that matter. There is no doubt that the improvement is directly due to the working of the Society's scheme for the regulation and encouragement of these associations. Three years ago deficiency in the character and overcharge in the price of manures supplied to some of these associations was the rule, and now it is the exception.

Of the 150 samples of manure and feeding stuffs supplied last year, only nine were found to be so deficient as to require investigation. In the case of two of these it was found that there had been some misunderstanding regarding the guarantee, for which the buyer was responsible. Other two had been made

good immediately the deficiency was observed, showing that they were cases of accidental deficiency that may easily occur, even despite some care on the part of the seller. Other two were found to be guaranteed in such a way as to make it possible for an inferior and overcharged article to be bought without the buyer having any claim against the seller for the deficiency. These will be referred to again. Another was a sample of manure which was not a manufactured article, and which, though falling beneath its guarantee, was sold at a price far below its value. Out of the nine cases of deficiency there are only two which, upon investigation, have been found to fall within the category which, by Regulation III*a*., require to be published in this report. One of these was supplied to a member of the Wester Ross Analytical Association. It was a sample of dissolved bones, sold by Messrs D. G. & G. Ross, Dingwall, to Mr Murdo Bethune, Brae, Dingwall, under the following guarantee :—

Soluble phosphate,	22·4	per cent.
Insoluble „	10·2	„
Ammonia,	2·1	„

It was found to contain, on the average of three very closely agreeing analyses,

Soluble phosphate,	11·1	per cent.
Insoluble „	24·1	„
Ammonia,	1·9	„

The defect in this manure is that the soluble phosphate amounts only to half of the guarantee. The amount of insoluble phosphate is far in excess of the guarantee, and the total phosphate also is about 2½ per cent. over the guarantee. But when soluble phosphate is guaranteed and found deficient, it is not to be supposed that an excess of insoluble phosphate is adequate compensation for that deficiency. According to the Society's units, see Appendix B, p. 28, the relative values of the phosphates guaranteed and those supplied would be—

Guaranteed.

22·4	at	3s. 6d.	=	£3 18 6
10·2	at	1s. 6d.	=	0 15 3
				£4 13 9

Supplied.

11·1	at	3s. 6d.	=	£1 18 10
24·1	at	1s. 6d.	=	1 16 2
				£3 14 0

There is thus a difference of about 20s. per ton in the value of the phosphates as guaranteed and supplied. But even if the excess of insoluble phosphate had been sufficient to compensate commercially for the value of the deficient soluble

phosphate, it might have been no real compensation at all, for the insoluble phosphate, whatever its origin, might be unsuited to the soil on which it was applied and of little use as manure. In such a case the loss of the buyer is not limited to 20s. per ton, but it includes probably the deficiency of a turnip crop, which may amount to several pounds per acre. Manure merchants are not sufficiently aware of the responsibility they incur in supplying manures differing from the guarantee. There is not always time to have a manure analysed previous to sowing, and if the manure after application is found to be deficient from the guarantee, any loss arising out of that deficiency to which the buyer is subjected in the proper application of the manure is a loss for which the seller is responsible. The buyer is entitled to trust to the accuracy of the guarantee, for a guarantee is a bond. The position of a manure merchant is therefore one of great trust, and should be felt to be one of great responsiblity.

The other deficient manure was sold to a member of the Strathearn Analytical Association. It was a sample of "Turnip Manure," supplied by Messrs Somerville & Co., Montrose, through their agent at Perth, to Mr James Donaldson, Gloagburn. It was guaranteed to contain 5·75 per cent. ammonia, and 25 to 27 per cent. phosphates, fully one half soluble. It was found by the analyst of the association to contain—

Soluble phosphate,	7·84	per cent.
Insoluble „	11·24	„
Ammonia,	4·62	„
Potash,	3·10	„

When the deficiency was observed, a second sample was sent to me with the consent of the sellers, who expressed their willingness to make compensation for any deficiency. It was found to contain—

Soluble phosphate,	4·47	per cent.
Insoluble „	11·17	„
Ammonia,	4·93	„
Potash,	2·67	„

This result was communicated to the sellers, who took no notice of it. They explain that the report of the second analysis was mislaid, and the circumstance escaped their recollection, and they repeat their wish to pay or give rebate for the deficiency.

It must also be mentioned that the guarantee given above is subject to an allowance of ½ per cent. ammonia, and 3 per cent. phosphates, to cover possible variations in manufacture. In both these cases of deficient manures, the deficiency exceeded one-tenth of the nett amount guaranteed, and they are published here in accordance with Regulation III. (App. B, p. 20).

Besides these cases, there were others which would have been

recorded had the buyers not been too careless in the matter of their guarantees, or the associations been too lax in their methods of taking and preserving samples. Among the former cases was one from the Kelso Association, where the guarantee was only a verbal one, and where the seller claimed that the buyer must have misunderstood the exact terms of it. Among the latter were cases where the seller had not had an opportunity afforded him of seeing the sample drawn, or where the sample had not been properly secured or had been destroyed. There were other cases in which the buyer was very sharply dealt with, owing to the peculiar terms of the guarantee.

It is not sufficient to have a guarantee, and that a written one. There are guarantees which are so worded as to appear to guarantee much more than they really do. Thus, when a manure is guaranteed to contain from 20 to 25 of phosphates, it rarely happens that it contains more than 20 per cent. It frequently contains much less—probably about 17 per cent.; and when the buyer, who was fairly entitled to expect about 22 per cent., makes a complaint regarding the deficiency, he is informed that there is no real deficiency, as the manures are all sold under a margin of 3 per cent. phosphates. Similarly, manures guaranteed to contain from 2 to 3 per cent. of ammonia are frequently found to contain only $1\frac{1}{2}$ per cent., but here again the buyer is informed that a margin of $\frac{1}{2}$ per cent. is claimed in ammonia. These margins of 3 per cent. phosphates and $\frac{1}{2}$ per cent. ammonia are usually printed in the first page of a price list, and seem to be claimed quite irrespective of the total amounts of these substances contained in the manure.

It may contain 70 per cent. of phosphates, or it may contain only 10 per cent.; it may contain 12 per cent. of ammonia, or it may contain 1 per cent.; the margins remain the same. This is not as it ought to be. It is right that there should be a margin, but it should be some reasonable proportion of the total amount guaranteed. Under this fixed margin, it would be possible to sell as a manure a substance that was not a manure at all; it has only to be guaranteed to contain from 3 to 6 per cent. of soluble phosphate and from $\frac{1}{2}$ to 3 per cent. of ammonia, "with the usual margin," and it may be rubbish containing none of these things. There are two ways of allowing a margin, —either the stuff is guaranteed to contain an ingredient somewhere between a minimum and maximum limit, such as from 20 to 23 per cent., meaning by that, that in no case will the ingredient fall below 20 per cent. or rise above 23; or a definite analysis is given, and a certain range of margin is agreed upon to cover differences in manufacture or in analysis by different chemists. Either one or other of these methods may be fairly used, but there are some merchants who claim both these

margins for the same manure. They give a minimum and maximum guarantee, and claim a margin below the minimum; that is to say, they claim a double margin. There is a want of straightforwardness about that kind of guarantee, and manures offered in that way ought to be avoided.

There is another kind of guarantee that is a dangerous one for the buyer. It is sometimes expressed in the written guarantee that any deficiency in one constituent may be balanced by excess in another; such as a deficiency in soluble phosphate to be made good by excess of insoluble phosphate, or by excess of ammonia or of potash. Intelligent manuring cannot go on under such a guarantee, which is based upon the erroneous principle that the only difference between the various constituents of a manure is their price, and that one mixture is as good as another, so long as it contains the same money value of materials. Some of the guarantees of the manures supplied to associations last year were of the kinds above described. They were very deficient manures, but the Society refrain from publishing them, for though they evade the spirit they comply with the letter of Regulation III.

A guarantee affords security only when it is a good guarantee, and the exact terms of a guarantee ought to be carefully noted before accepting it. Instances are not wanting in which manures are sold under guarantees, which could not apply to them if the manures were genuine, and it is important that the buyer should be acquainted with the proportion of the various constituents which ought to exist in a genuine manure of the kind he desires to buy. Useful information on this point will be found in Appendix B, p. 21, where all the manures in common use are described, and the proper proportions of their constituents are defined in numbers per cent.

It is satisfactory that out of so large a number of manures the number of samples showing a marked deficiency is so few. It is a sign that the analytical associations throughout the country are doing good work, and the Committee hope that when the benefits derived from such associations becomes better known their number will be largely increased. There are many districts throughout the country where no such organisations exist, and there is good ground to fear that, for the want of them, the buyers of these districts are annually subjecting themselves to great pecuniary loss. They are also losing the opportunity afforded by co-operation of becoming better acquainted with the nature and use of artificial manures.

With the view of encouraging the formation of such associations, and of inducing all those already formed to come under the Society's regulations, the Directors have this year doubled the amount of their grant. The Society now offers to all

analytical associations, properly constituted and satisfactorily managed, the sum of 10s. for each complete analysis, and 5s. for each partial analysis of manure or feeding stuff analysed through its agency.

There is a considerable amount of trouble incurred in the management of analytical associations, and the most of it devolves upon the secretary, who, unless he is an enthusiast in the cause, cannot be expected to devote his time and energy to the association's work without some remuneration, and if the increased expense involved in carrying out the Society's regulations has hitherto deterred any associations from accepting these, it is hoped that the augmentation of the grant may tend to remove that difficulty.

Among the manures and feeding stuffs supplied to the members of associations were a few whose analysis may be of interest to others besides those for whom they were performed.

Calf Food.—A feeding stuff called "Lactina," and another called "Calf Food," were supplied to the members of the Lanarkshire Association.

They were sold without an analytical guarantee, and were found to contain—

	Lactina, per cent.	Calf Meal, per cent.
Albuminoid matter, .	14·00	11·25
Oil, ...	2·27	6·92
Carbohydrates, . .	68·39	69·48

The former was sold at £24 per ton, and the latter at £26 per ton.

Other samples of lactina and calf meal, which were analysed by me during the past year, had the following composition :—

	Lactina.	Calf Meal.	Calf Food.	Barley Meal.
Albuminoid matter, .	11·77	13·55	12·66	13·26
Oil, ...	1·65	7·17	7·64	2·11
Carbohydrates, . .	64·88	63·10	63·35	65·53
Woody fibre, . .	2·95	1·60	1·50	2·56
Moisture, . . .	15·50	12·25	12·39	13·44
Ash, ...	3·25	2·33	2·46	3·10

It will be seen that the composition of these substances approaches very closely that of barley meal. In some the amount of oil is considerably more than is found in barley meal, and approaches more nearly to that contained in Indian corn meal.

Compared with average linseed cake, they contain less than half its albuminoid matter, and nearly double its carbohydrates. They have therefore a wide nitrogen ratio, and a correspondingly

low feeding value. When valued according to the units applicable to linseed cake, viz., 3s. 9d. per unit of albuminoid matter and oil, and 1s. per unit of carbohydrates, their value scarcely reaches £7 per ton. Barley meal can be bought at about one-third the price of these substances, so that the prices paid for them is out of all proportion to their feeding value.

Soot.—A sample of soot supplied to a member of the Kelso Analytical Association was found to contain—

Phosphates, . . .	0·78 per cent.
Ammonia, . . .	4·26 „

The composition of soot is apt to vary very much, as it depends not only on the kind of coal which produced it, but also and perhaps chiefly on the way in which the coal is burned. The above represents a good kind of soot, somewhat above average, although it fell considerably below its guarantee, which was 1·92 per cent. phosphates and 6·12 per cent. ammonia. A guarantee of soot has to be received with caution, as from its great variability throughout the bulk it is difficult to prepare in such a way as to yield a representative sample.

Pigeon Dung.—A member of the same association bought a quantity of pigeon dung, whose composition was not guaranteed, but which was found on analysis to contain—

Phosphates, . . .	2·54 per cent.
Ammonia, . . .	1·21 „

The price paid for it was at the rate of £3, 10s. per ton, which is more than double its value. The buyer may have thought, as many would naturally enough think, that this kind of manure would in some measure resemble an ammoniacal guano, such as Ichaboe guano, which is a recently formed deposit. But the character of the dung of birds is determined by the nature of their food, and the food of granivorous birds, like pigeons, is very different from that of the fish-eating birds to whom we owe the guano deposits. This is just another instance of the disadvantage of buying a manure without an analytical guarantee.

The number and variety of phosphatic materials offered to farmers and manufacturers is very considerable, and has hitherto been greater than in the case of other manurial substances. It is gratifying to find that the number of nitrogenous materials is now rapidly increasing, and it is evident from the high prices being paid for them that they are much appreciated. High class Peruvian guano, the supply of which fell away so much lately, is now being more freely imported. Those who are acquainted with the extent of the guano deposits assure us that the day is not far distant when the supply of that splendid manure will cease, and we must therefore regard with interest every other

form of nitrogenous manure, which in quality and excellence of manufacture is able to take its place. Fish guano, which from its nature and origin should be an inexhaustible source of richly nitrogenous manure, is a substance of that kind and it is evident from the excellence of the exhibits at the late Fishery Exhibitions, that a very marked improvement in its manufacture is being effected. The chief obstacle to the efficacy of that manure is the large amount of oil it contains, but samples which have been sent for exhibition show that this defect is being overcome. Instead of containing 10 per cent. of oil, as has hitherto been the rule, it is now being produced with less than 3 per cent. of oil, and in a state of fineness of manufacture which leaves little to be desired. From South America there are also being imported highly nitrogenous manures in fine condition, under the name of Fray Bentos guano. These are the worked-up carcasses and offal of bullocks slaughtered for the sake of their beef extract, and for their hides and horns. Recent importations of these substances analysed by me gave the following results:—

	Fray Bentos Guano.	Ground Hoofs.	Meat Meal Residues.	Residues.
* Phosphoric acid, .	9·98	19·19	1·02	9·70
Lime, alkalis, &c., .	15·14	29·29	1·14	13·80
† Organic matter, .	65·30	41·60	89·20	65·90
Moisture, . . .	8·40	6·70	8·20	9·40
Insoluble matter, .	1·18	3·22	0·44	1·20
	100·00	100·00	100·00	100·00
* Equal to phosphate of lime, . . .	21·78	41·82	2·23	20·67
† Containing nitrogen = ammonia, . .	9·52	6·97	15·30	10·90

The recent falling off in the supply of high class guano has given an impetus to the manufacture of mixtures more or less resembling it. A low class guano, that is to say, one which is poor in ammonia, can be *improved* so as to resemble in some measure a high class one by the addition of sulphate of ammonia, and the various other characters of high class guano can to some extent be imitated. There is no harm in such mixtures so long as they are are sold as such, and the purchaser is made aware of what he is buying, but to sell such mixtures under the name of genuine guano is a fraud. Ammonia, in sulphate of ammonia, has been selling at less than 15s. per unit, when the ammonia in high class guano was selling at over 20s. per unit. It may be that the price of ammonia in high class Peruvian

guano is a fancy one, but it is one which many are quite willing to pay if the article is genuine, and it is a manifest injustice to sell ammonia in the form of sulphate, as if it were the ammonia of genuine guano.

Fortunately, the adulteration is easily detected by any chemist who makes a study of it, for genuine guano is a complex substance, whose various constituents bear certain proportions to each other, so that when any one ingredient, such as ammonia, is high, others are found to vary in a corresponding manner.

Nitrogenous manures are the great want of high farming, and it is gratifying to find that the supply of these is now so abundant, and the prices so low in comparison with those of recent years. Nitrate of soda and sulphate of ammonia, which are the most powerful and valuable of all nitrogenous manures, are now to be had at prices which will do much to brighten the prospects of agriculture in the immediate future; and the recent improvements made by Bielby and Grouven, in the extraction of ammonia from paraffin shales, coals, turf, and similar substances, afford the prospect of a cheap and ever-increasing supply of sulphate of ammonia for the use of farmers.

Prickly Comfrey.—This is a plant which has been long before the public, and has been strongly recommended as a means of giving abundant green fodder on a limited area. It does not seem to have obtained much popularity north of the Tweed, but there seems no reason why it should not be grown as a very useful adjunct to the resources of the farm.

I received two samples from Mr Mackenzie of Portmore, and made an analysis of them. No. 1 was cut in the young state when it was not more than a foot high, and No. 2 was taken from the same bed when about 3 feet high—

	No. 1.	No. 2.
Albuminoid matter,	2·09	2·09
Oil,	0·41	0·51
Carbohydrates, &c.,	4·88	3·04
Water,	90·15	92·41
Woody fibre,	0·78	0·80
Ash,	1·69	1·15
	100·00	100·00

These analyses show that this plant is an excellent kind of fodder. It consists, as turnips do, of upwards of 90 per cent. of water, but the amount of albuminoid matter it contains is more than double that usually contained in turnips. It requires to be well nourished in order to produce good results; but it is said that, when properly manured and cultivated, it produces from 50 to 60 tons per acre of green fodder annually.

It is a plant well adapted for a sewage farm, and would produce very good results if grown on "areas of downward filtration," such as are now becoming common in inland towns as a useful and successful method of disposing of the sewage.

[*Edinburgh, 8th Aug.* 1883.

The Directors, at a meeting held on the 26th July, had brought under their notice, by the Chemical Committee, the complaint of Mr Ramsay, Eden Bone Mills, Cupar-Fife, as to the publication, at page 246 in the *Transactions* of 1883, of an analysis of a grass manure sold to Mr Mackie, Invermay. After considering Mr Ramsay's statements and the explanations furnished by Dr Aitken, the Directors resolved to express their regret that particulars regarding this manure should have been published, as they are satisfied there have been errors in sampling and in the statement of analysis.

F. N. Menzies, *Secretary.*]

ENSILAGE.

By Dr A. P. Aitken.

The rapidity with which the making of ensilage has come to be regarded as an important addition to the resources of the farm has perhaps not been equalled in the case of any other great agricultural improvement. About two years ago there were few farmers in the country who knew the meaning of the word, or had even heard of the substance, and now experiments are being made with it in all directions, and the success which has attended the making of ensilage has surpassed all expectations.

The experiments being conducted by Mr Mackenzie of Portmore, under the auspices of the Highland and Agricultural Society, are described in another part of this volume, and the details of the process of making, filling, and emptying a silo are practically explained. A few words regarding the principles underlying the practice of ensiling, the kind of crops suitable for the purpose, and the changes they undergo in the silo, may form a useful supplement to that paper.

The making of ensilage may be described in a word as "the preservation of green fodder." Any change which the fodder undergoes in the silo ought to be regarded as accidental, and so far an interference with the main object in view, which is not to improve the fodder, but to preserve it. If it could be brought out of the silo exactly in the same condition in which it was put in, that would be perfect ensilage, and the nearer we approach that standard in our ensiling operations the greater is our measure of success. It is not unnatural that some should have formed a higher ideal of ensilage. Enthusiastic writers describe the silo as not only a place for preserving fodder, but a

kind of laboratory where it undergoes changes of a formative or elaborative kind, so that after being for some months crushed up in the dark, it is able to be brought out in a state more suitable for the nourishment of cattle. There are some coarse kinds of fodder, such as maize, whose hard tough tissues are not well suited for cattle, nor much relished by them, and which when put into a silo, and subjected to some fermentation, are rendered softer and more palatable; but that cannot be said of the clovers, vetches, and sweet grasses that form the chief ensilage in this country. It is difficult to imagine any fodder more suitable for cattle than such crops as these when cut at their juiciest and most vigorous stage. They are already the natural and choicest food of cattle, and any change which they may undergo in a silo cannot be of a constructive or elaborative kind, but rather of a destructive or degenerative kind. Construction is the work going on in the body of the living plant, the material out of which its tissues are made are derived from outside of it, from the soil and from the air, and the moving power which builds these tissues up is the energy of the sun's rays. When the plant is cut down and crushed into a dark pit, any changes which can occur are not those of building up, but rather of breaking down. Any elaboration that can go on as the result of chemical or physiological changes must be at the expense of the material stored there; it must result in a loss, and cannot produce any gain of matter. If any part of the stored material is rendered sweeter or more soluble, or acquires a certain alcoholic odour or acid flavour which is agreeable to cattle, these properties are not got for nothing; they are got as the result of changes of a destructive kind, whose gross effect is to diminish the total amount of nutritive matter in the silo. It is for these reasons that we must define perfect ensilage in this country, as green fodder preserved without change. It is needless to say that this is a standard that cannot be attained in a silo; but if ensilage is to be a permanent institution in the country, I am confident that in a short time we shall attain to a measure of excellence in the manufacture of it which will not fall far short of the perfect standard.

The means to be employed for preserving green fodder will be best understood if we fully appreciate the meaning of the changes which green fodder undergoes when cut down, and deprived of the sap and nourishment which flowed up continuously from its roots. With the cessation of the flow of sap the vigour of the plant ceases, and it is easily attacked by agencies which during its growth it was able to resist. Chief amongst these agencies are innumerable small microscopic organisms which cluster upon all green crops, and which feed upon their tissues, and rapidly consume them whenever external conditions

are favourable. When grass freshly cut is put into a heap these organisms, or ferments, as they are called, find in the stillness, warmth, and moisture of the air within the heap a set of conditions favourable to their rapid development, and they increase with enormous rapidity, and attack and live upon the tissues of the fodder. Vegetable matter is their food, just as it is the food of cattle. There are many different kinds of them. One set of them lives chiefly upon the carbohydrates or starchy and sugary matter of the plant, converting these into alcohol, and at the same time producing carbonic acid gas. These are organisms resembling yeast, and they produce the *alcoholic fermentation.* Another set carry the process a stage further, and convert the alcohol into acetic acid or vinegar, producing the *acetic fermentation.* There are others producing various other kinds of products, such as lactic acid, the acid contained in sour milk, and butyric acid, the acid found in rancid butter. All these and many others prey upon the carbohydrates of the plant. There are other exceedingly minute organisms of a different kind, which attack chiefly the albuminoid constituents of the fodder, decomposing them and converting them into various nitrogenous substances less complex than albumen, which have no feeding value. Among the products of this decomposition are ammonia and allied substances having a strong pungent and disagreeable odour. These ferments are known under the name of bacteria, and they produce what is called the *putrid fermentation.* Their name is legion, and their nature is little understood; but the result of their work is that the fodder putrefies or becomes rotten. There are other living organisms which follow upon these, but it is needless to pursue the subject further, for it is not the last but the first stages of fermentation with which we are here concerned. The object to be attained in making ensilage is to prevent these organisms from carrying on the changes referred to. If we could stop their changes at the beginning, we should have perfect ensilage, but the further we allow the fermentative change to go on, the worse and worse the ensilage becomes. What chiefly interests us here is to know how these ferments may be killed or rendered inactive, without doing injury to the fodder. There are several ways in which this can be done. Like all other living creatures, they require air, warmth, and moisture; if they are deprived of oxygen, or subjected to extreme cold or great heat, or if they are dried up, they die, and even if these means are not carried to an extreme degree their lives may be rendered comparatively inactive. Thus, when grass is rapidly dried in the sun, and converted into hay, they have not moisture enough to favour their growth and development, and their work is almost put an end to, so that hay can be kept for a long time in the air with very little change. If

grass were subjected to a high temperature, by means of steam, for instance, and sealed up in an air-tight box at that temperature, it might be kept green and moist for any length of time. This is what is done in the tinning of peas and other vegetables. If deprived of air, or rather the oxygen contained in the air, or if surrounded by any gas which does not contain free oxygen, grass or other green fodder can be kept moist and fresh for a very long time. This is what is done in a silo. When green fodder is thrown into a silo, and pressed down so as to diminish as much as possible the air space within it, the amount of oxygen is very small in comparison with the mass of solid material; and if the walls of the silo are air-tight, and the surface of the heap covered over with some impervious covering, and the whole subjected to continuous pressure, the limited supply of oxygen contained in the substance and the interstices of the fodder is very soon used up by the ferments, and when that point is attained the fermentation ceases. A certain quantity of alcohol is found, determined by the quantity of oxygen originally present, and some of this may be converted into acetic acid, &c.; but as the oxygen is used up, the carbonic acid formed at the same time goes on increasing in amount, until the oxygen is exhausted, and carbonic acid has taken its place. The ferments are thus practically suffocated, and so long as the carbonic acid does not get away, and air take its place again, the fodder is preserved from fermentation and the other putrefactive changes referred to. One great object to aim at in filling a silo is therefore to diminish the quantity of air space. If the stuff to be ensiled is hard and reedy, such as oats, the quantity of air contained in the tubes of the straw is so great, that the ferments are able to live and work for a comparatively long time before their supply of oxygen is used up. The fermentation will not stop at the alcoholic stage, but it will go on to the formation of acids, and part of it will putrefy. The ensilage will be of a sour taste, and have a putrid smell, and there will be a considerable loss of feeding material on account of the extent of the fermentation. If, before ensiling, the green straw had been passed through a chaff-cutter, it would have packed much closer, and crushed much easier, and preserved much better. If, on the other hand, the crop is grass, especially meadow grass or soft grasses, or an aftermath, with much leaf and little stem, the stuff packs together flat and firm, allowing of almost no interstitial air, and the ensilage formed is sweet of smell and taste, with only a trace of alcoholic odour, and the whole colour and characters of the plants are retained almost unchanged. Ensilage of this kind well weighted comes very near the perfect standard.

The mouldiness frequently observed on the surface, and along the sides of ensilage, is due to the presence of air, which enables the spores of the humble mould plants to germinate and develop. They are not necessary concomitants of ensilage, and with a little care they can be avoided. The spores of the mould are growing on the walls of the silo, and on the planks which are used to cover it. If, before putting in the forage, the walls of the silo were washed with bisulphite of lime, and if the boards which cover the top were washed with it, or with carbolic acid, or if a felting steeped in an aqueous solution of carbolic acid were used to cover the fodder before putting on the boards, there would be no appearance of mould when the silo was opened. It is probable that the employment of antiseptics in a more thoroughgoing way may be found not only to prevent mouldiness on the surface, but to check fermentation all through the mass, and thus produce perfect ensilage. This is a matter for experiment.

The success of ensiling as at present practised thus turns upon the exclusion of air. The more thoroughly that is done the better the ensilage. Chaff cutting, tramping, and heavy weighing are the means used for that purpose, and to these may be added watering. I have seen samples of oat ensilage which, while being ensiled, was drenched with water, and the result was very good. The water took the place of air in the straw, and enabled it to pack closer, and the ensilage had a sweet etheric aroma, very slight acidity, and it seemed to have suffered very little change.

Opinions seem to vary very much as to the quality of ensilage. There are some who prefer that it should be acid, and certainly cattle do not object to a little vinegar in their food, any more than we do, and, fortunately, they seem to be rather attracted than repelled by a "gamey" flavour in ensilage. In Germany, Holland, and elsewhere, the making of ensilage has been practised for more than a century, and the product obtained by the simple method used there is a very acid one. It is known under the name of "Sauerheu," or sour hay, and it is as much relished by cattle as "Sauerkraut" (which is just a kind of domestic ensilage) is by the peasantry. So far as acceptability to cattle is concerned, there is no difficulty in preserving fodder, even with comparatively rough and imperfect appliances. A mere pit dug in the earth packed tight with fresh grass, and weighted with nothing but the earth which was dug out of it, produces an ensilage which cattle eat with pleasure. But the question which has to be answered before such ensilage can be pronounced a success in this country, is whether fodder stored in that way is economical. That is a question somewhat difficult to answer. It would be more economical than to attempt to

make the grass into hay during a wet season, for hay frequently wetted and much knocked about loses more feeding quality than grass allowed to ferment and become sour in a pit. On the other hand, if grass can be made rapidly into hay, and preserved in good condition, it must retain more of its feeding quality than sour hay which has been subjected to a prolonged fermentation. In the West Highlands, and in hilly parts of the country, where the rainfall is great, and hay is difficult to secure, the making of sour hay in dry pits, like potato pits, only much deeper, about 6 or 8 feet deep, would no doubt be economical. A three feet covering of earth is sufficient to keep the fermentation from going too far, if it is occasionally beaten smooth with a spade, to fill up all cracks and crevices that may occur during the sinking of the heap.

We now come to the question, of the suitability of ensilage as a means of preserving our more valuable fodder crops. That is a large question—a many-sided one, and one that cannot be answered by laboratory experiments alone. It cannot be answered satisfactorily, until feeding experiments have been made with ensilage in a most careful manner. The plants which are suitable for ensilage in this country are very valuable feeding materials, and are produced at much expense. It is also well known—though perhaps not so well known as it should be—that they cannot be preserved without some loss, and in many cases the loss is very considerable, so that any means that can be employed to diminish that loss is of importance. The composition of the plants grown in this country which might be suitable for ensiling, is given in the Table No. I.; they are the analyses of Dr Emil Wolff of Hohenheim. There is a considerable range in the richness of these crops. Maize has not one-half of the feeding value of grass, and turnips has only about one-third of the value of the average grasses. Thus, in making grass into ensilage, we are operating with a very valuable material, and must be very careful to avoid deterioration as much as possible.

The figures in this table of chief interest are those indicating the percentage of albuminoids, for it is upon the proportion of these that the feeding value of the fodder chiefly turns. The column next to it, showing the total nitrogen reckoned into albuminoid matter, contains much higher figures, and shows that much that was formerly considered albumen is not really so, but some other form of nitrogenous matter; on an average, the true albumen is just about two-thirds of that calculated from the total nitrogen. On Table II. are notes of the analyses of various samples of ensilage, the first four of which were taken from the silos of Mr Mackenzie of Portmore. Nos. 5, 6, 7, and 8,

No. I.—Composition of Fodder Plants suitable for Ensilage.

	Water.	Organic matter.	Ash.	Woody fibre.	Total Nitrogen as Albumen.	Nutritive matter.		
						Albumen.	Carbo-hydrates.	Fat.
	p. cnt.	p. cnt.	p. cnt.	p. cnt.	p. cnt.	p. cnt.	p. cnt.	p. cnt.
Grass (before bloom),	75·0	22·9	2·1	6·0	3·0	2·0	13·0	0·4
Italian ryegrass,	73·4	23·8	2·8	7·1	3·6	2·3	12·6	0·4
Perennial ryegrass,	70·0	28·0	2·0	10·6	3·6	1·8	12·2	0·3
Timothy,	70·0	27·9	2·1	10·1	3·4	1·9	14·2	0·5
Red clover (in flower),	78·0	20·3	1·7	6·8	3·2	1·8	9·6	0·5
White clover ,,	80·5	17·5	2·0	6·0	3·5	2·2	7·9	0·5
Alsike clover ,,	82·0	16·2	1·8	4·5	3·3	1·8	6·9	0·3
Sainfoin,	80·0	18·5	1·5	6·5	3·2	2·1	8·0	0·3
Vetches,	82·0	16·2	1·8	5·5	3·5	2·5	6·7	0·3
Peas,	81·5	17·0	1·5	5·6	3·2	2·2	7·4	0·3
Beans,	87·3	11·7	1·0	3·5	2·8	2·0	5·2	0·2
Green rye,	76·0	22·4	1·6	7·9	3·3	1·9	11·0	0·4
Green oats,	81·0	17·6	1·4	6·5	2·3	1·3	8·9	0·2
Green maize,	82·2	16·7	1·1	4·7	1·2	0·8	9·9	0·2
Rape,	87·0	11·4	1·6	4·2	2·9	2·0	4·8	0·4
Cabbage,	89·0	9·8	1·2	2·0	1·5	1·1	6·0	0·2
Turnip tops,	88·4	9·3	2·3	1·6	2·1	1·5	5·1	0·3
Turnips,	92·0	7·3	0·7	0·8	1·1	1·1	5·3	0·1

No. II.—Analyses of Ensilage.

No. of Sample.		Water.	Ash.	Woody fibre.	Total Nitrogen as Albumen.	True Albumen.	Non-nitrogenous matter (Carbohydrates).	Fat.	Acidity as Acetic Acid.
1	Clover grass,	78·1	2·0	6·2	1·40	1·06	11·2	·05	1·0
2	Old pasture,	75·4	2·4	6·8	1·21	1·10	13·0	·06	1·11
3	Plantation grass,	77·5	1·8	5·5	1·67	1·53	12·4	·08	1·05
4	Green oats,	78·0	1·7	6·3	1·20	0·60	11·7	·13	1·00
5	Tares, oats, and beans,	74·7	2·2	6·0	2·01	1·82	13·0	·13	...
6	Tares and hay-grass,	78·0	1·5	4·9	1·85	1·52	12·6	·11	...
7	Clover grass, mostly clover,	82·5	1·6	4·1	1·32	1·27	9·3	·14	...
8	Hill pasture,	78·8	1·0	6·4	9·98	0·94	12·8	·09	...

were from Mr Young's silo at Blackadder West, and No. 8 from the silo of Mr Oliver, Howpasley.

If we compare the results on that table with those on Table I. we see that there is a marked diminution in the amount of albumen, and also that there is a great disappearance of the

nitrogenous matter which is not albumen. There is evidently going on in the silo some process destructive of albuminoid matter, and there is no doubt that that is a change brought about by the work of the living organisms already referred to. There is also another process going on, which accounts for some of this loss, and for that of the soluble nitrogenous matter, viz., the constant draining down of soluble matter, including soluble albumen, through the mass, so that the lower layer of the silo is drenched with sap carried down from the superincumbent mass. When the silo is first cut into, and the ensilage removed from a part of the floor, this sap flows into the vacant space, forming a pool several inches deep. This liquid is not lost, as it can be soaked up by chaff or other dry fodder and given to cattle, and may be used as a means of giving a relish to straw or other inferior feeding material.

The figures containing the carbohydrates and some other extractive matter are got by difference, and cannot be compared with those on Dr Wolff's table, which are got in a different way. There is a great disappearance of oil whose quantity at the best is very small, and there is no doubt that there is a loss of carbohydrates in the silo, as the result of alcoholic and acid fermentations. We should have expected a relative increase in woody fibre, due to the conversion and soaking away of the constituents; but there appears to be rather a decrease in that constituent, and it is probable that a certain proportion of that substance which chemists usually classify as woody fibre has been converted into carbohydrates. When cellulose or woody fibre is digested in a weak solution of acid for a long time it becomes converted into dextrine and sugar, and it seems probable that this is one beneficial change going on in a silo. Against this beneficial change we must put the absolute loss of some carbohydrates, which is inevitable, and the loss of some albumen. The extent to which these important constituents of fodder are lost in the process of ensiling depends on the amount of fermentation that is allowed to go on, and there can be no doubt that much of that loss is preventible by adopting a more perfect system of ensiling. We have good reason to believe that this loss, at least to the extent indicated, is not inherent in the process; on the contrary, it is highly probable that if proper precautions are taken to prevent fermentation, there is no way in which it is possible to preserve fodder so well as in the green state.

In the making of hay there is a considerable loss, and when badly secured that loss frequently amounts to two-thirds of the whole nutritive constituents. Some analyses by Dr Wolff (Table III.) show this very clearly. The first three analyses show that meadow hay in fine condition has about three times the value

of poor hay, and that fine clover hay has twice the value of poor clover hay.

No. III.—Analysis of Hay.

No. of sample.		Water.	Ash.	Organic matter.	Woody fibre.	Total Nitrogen as Albumen.	Nutritive matter.		
							Albumen.	Carbo-hydrate.	Fat.
		p. cnt.	p. cnt.	p. c	p. cnt	p. cnt.	p. cnt.	p. cnt.	p. cnt.
1	Meadow hay, poor,	14·3	5·0	80·7	33·5	7·5	3·4	34·9	0·5
2	,, meddling,	14·3	6·2	79·5	26·3	9·7	5·4	41·1	0·9
3	,, very fine,	16·0	7·7	76·3	19·3	13·5	9·2	43·1	1·2
4	Red clover hay, poor,	15·0	5·1	79·9	28·9	11·1	5·7	37·9	1·0
5	,, meddling,	16·0	5·3	78·7	26·0	12·3	7·0	38·1	1·2
6	,, very fine,	16·5	7·0	76·5	22·2	15·3	10·7	37·6	2·1
7	Italian ryegrass hay,	14·3	7·8	77·9	22·9	11·2	7·1	41·5	1·4
8	Perennial ,, ,,	14·3	6·5	79·2	30·2	10·2	5·1	35·3	0·8
9	Timothy hay,	14·3	4·5	81·2	22·7	9·7	5·8	43·4	1·4

Good hay is made into bad hay by the washing away of soluble constituents and by fermentation. The albumen, carbohydrates, and fat all become less and less, and the proportion of woody fibre becomes greater. But, even when hay is well made, it must not be supposed that it is kept without change. The organisms at work in the silo are also in the hay, and they are consuming the fodder none the less surely, though the work is slow, and unaccompanied by the great rise of temperature and exhalation of pungent gas, which attracts attention in the making of ensilage. There is no doubt that well-made ensilage, as at present produced, is far superior to ill-secured hay, but whether it is as good as the best hay is a matter which must be decided by feeding experiments. If the ensilage were of the perfect kind already referred to, or somewhat approaching it, it would be superior to even the best hay.

The ensilage made at the silos at Portmore was good, but it was far from perfect, and it was put in in layers of various crops, more to test roughly the practicability of the process at all than to establish any accurate comparison between the feeding properties of hay and ensilage. The drippings from one kind of crop flowed down and mixed with the others below it, so as to destroy their individuality, and the analyses given in Table II. cannot be taken as affording more than a rough estimate of the value of the various kinds of ensilage.

The most surprising result in that table is the high value of plantation grass, which has the second highest amount of albumen, although classed with highly nitrogenous fodders, like vetches and clover. There is no doubt that some of this was

borrowed from other parts of the silo; but there is another point of great importance here, and that is, that this particular sample of ensilage was of a close, compact nature, and suffered less change in the silo than any of the others. Not only so, but for some months after the sample was taken out of the silo, and simply kept in a tin box, it has kept as sweet and perfect as it was when taken out. Plantation grass put into a silo and well made into ensilage is pure gain, and wherever there is a large extent of that feeding material going to waste, a silo would be a very great saving.

The hay crop at Earlypier and Harcus, made from the same materials as were put into the silos, was not secured in very good condition, and samples of it which I have analysed show that the loss of nutritive matter is considerably greater than that sustained by the ensilage. Owing to the circumstance that the various crops were piled into the same silo, and got mixed with each other to some extent, an accurate comparison of the hay with the corresponding ensilage is not possible; but, stated in general terms, the amount of nutritive matter contained in the ensilage dried at 212° Fahr., may be reckoned as about one-fourth more than that of the hay dried at the same temperature. Considering the altitude of the farms of Earlypier and Harcus, it is highly probable that the ensilage made last year is fully up to the average feeding quality of the hay made in that district.

There are many advantages claimed for ensilage, and these will require to receive careful attention, and now that the process has passed the stage of wonder and curiosity, it may be expected to be used with care and precision, so that its true place in the economy of the farm may be properly adjusted.

Some of the advantages of making ensilage may be shortly stated thus:—

It secures the crop at its juiciest and most nutritious period of growth.

It is independent of the weather.

It is suitable for high late districts, or for late wet seasons, when hay cannot be well made or oats properly ripened.

It enables the crop to be early taken off the ground, whereby the land may be sooner made available for other purposes, such as pasturing, or sowing a second crop.

It prevents loss when grass comes away too abundantly, or when there is too much roughness on the pastures.

It enables all kinds of waste grass from roadsides and plantations to be secured in good condition.

It is more economical to produce, and is a better feeding material than turnips.

It is especially suited for clay land, where turnips are grown with difficulty, and where the land is frequently too wet for grazing.

It is found to produce an increased flow of milk when fed to dairy cows, and does not affect the taste of the milk or the butter. It may also enable dairy farmers to begin cheese making at an earlier date.

It would be suitable for lambing ewes if acceptable to them as fodder, and would especially secure the safety and progress of hill stock in severe winters and seasons when grass is late of coming.

It is able to be kept for a long time, and can be turned out in good condition when stored turnips are rapidly decaying or entirely used up.

When properly made it is not liable to any accident, and reduces the feeding of stock to a system of the utmost simplicity.

PRACTICAL METHOD OF TESTING SOILS.

By Dr A. P. Aitken.

Seven-Plot Test.

In last year's volume of the *Transactions* (pp. 251–259) there was published the report of a considerable number of experiments, upon a uniform basis, conducted by farmers in various parts of the country, for the purpose of testing the manurial wants of their soils. The substances experimented with were the three ingredients of most importance in manures, viz., phosphoric acid, ammonia, and potash; and these were so applied as to furnish the experimenter with an analysis of his soil of a more practically useful kind than could be obtained in a chemical laboratory. The reports sent in by the various experimenters showed how great was the utility of such a system of soil-testing. It was found that on some farms the great want of the soil, as regards turnip-growing, was phosphates, and some soils required these in a soluble and others in an insoluble condition. On other soils it was found that the chief obstacle to the obtaining of a full crop of turnips was the want of nitrogen in the soil, and on others it was evident that potash was a much-wanted ingredient. Guided by the indications afforded by the test, the experimenters were in a position to mix up a turnip manure exactly suited to the requirements of their soils, and were thus enabled not only to avoid spending money on useless manurial ingredients, but also to escape the disappointment of finding that, after spending much money on manure, they had

not a remunerative turnip crop. Besides the special information conveyed by each experiment, it was found, upon comparing the various reports, that a matter of more than special interest had been elicited. It was found that the application of potash manures had in many instances not only failed to increase the crop, but had actually diminished it. A classification of the returns showed that the cases in which potash had done harm were those in which it had been applied to land that had been dunged in the drills. It did less harm where the land had been dunged in autumn; and the instances in which it had been beneficial were those in which it was not the practice to apply dung to the turnip break or where bone meal had been used instead of dung that year.

The information conveyed by the returns sent in from so many careful experimenters in various parts of the country deepened my conviction of the benefit to be derived from such a system of practical soil-testing, and I accordingly determined to bring the subject more prominently before the notice of farmers last year. Schedules were printed describing in detail the method of making the experiment in the form of a seven-plot test, and upwards of a hundred of these were sent to farmers in different parts of the country, but I regret to have to report that my application has not met with so great a response as I expected. Farmers are difficult to move. Only nine schedules containing details of the experiment have been returned. The chief details of these experiments are given here; but I am indebted to most of the experimenters for much additional information, showing that the work has been done in a most careful and reliable manner.

The inferences to be drawn from the results of the test are shown in the second-last column, and in the last column I have indicated what kind of manure would, in my opinion, be found most suitable as a turnip manure for the various soils under the conditions as to general manuring which prevailed in making the test.

The ingredients of the mixtures are given in cwts. per ton, and the quantity to be given per acre will depend on the condition of the land, and whether farm-yard manure is given along with it.

Regarding the use of potash, the few experiments recorded support the conclusions derived from last year's observations, viz., that where farm-yard manure is employed potash salts are not needed, and are apt to be injurious. Potash seems to have done harm at Heugh Head, and has on the whole been a profitless manure on dunged land, and even on the undunged lands it has not uniformly been beneficial. It is to be regretted that the experiments bearing on this question are so few, for the inevitable chances of error attending agricultural experiments are only to be overcome by multiplying the number and varying the

Seven-Plot Test—Turnips 1883.

	1	2	3	4	5	6	7
Manures—	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	
Superphosphate, per acre	5	5	5	5	...	...	Nothing
(or ground mineral) ,,	(3½)	(3½)	(3½)	(3½)			
Potash salts, . . ,,	1	...	1	...	1		
Nitrate of soda, . ,,	1	1	...	...	1	1	
Experimenters—	tons. cwt.	tons. cwt.	tons. cwt.	tons. cwt.	tons. cwt.	tons. cwt.	tons. cwt.
Caverhill, John, bulbs, super.	20 2	12 12	8 16	7 16	15 0	12 0	6 9
Greenburn, . ,, min.	18 6	15 6	10 0	9 6			
tops, super.	3 0	2 18	1 10	1 8	2 15	2 3	1 2
,, min.	2 18	2 12	1 12	1 12			
Gibb, R. S., bulbs, super.	14 4	16 0	9 18	11 2	13 11	11 14	8 14
Boon, Lauder, ,, min.	16 2	18 0	10 11	11 15			
tops, super.	3 7½	4 10	2 9	2 11	3 6	3 0	2 4
,, min.	4 5	4 19	2 16	2 17			
Harper, Wm., bulbs, super.	21 10	20 0	15 10	15 0	17 15	16 10	12 15
Sheriffhall ,, min.	16 10	20 0	13 10	14 0			
Mains,							
Logan, Adam S., bulbs, super.	12 7	14 1	10 5	11 7	14 15	13 12	11 19
Ferney Castle, ,, min.	14 6	17 1	11 17	12 10			
Reston, . . tops, super.	3 15	4 15	3 18	3 17	5 1	3 18	3 18
,, min.	4 11	5 7	4 5	3 17			
Munro, John, bulbs, super.	10 0	9 0	12 0	10 0	6 0	7 10	7 0
Fairnington, . ,, min.	8 0	6 0	10 0	6 0			
Purves, Wm., bulbs, super.	11 7	12 16	10 10	10 12	11 0	13 0	10 12
Heugh Head, ,, min.	10 0	11 5	9 0	10 0			
Reston, . . tops, super.	1 19	1 18	1 14	1 12	1 17	2 3	1 14
,, min.	1 15	1 15	1 12	1 15			
Reekie, Wm., bulbs, super.	16 10	14 13	14 10	15 10	14 15	16 5	14 5
Carterhaugh, ,, min.	13 3	13 10	17 10	13 13			
Selkirk, . . tops, super.	4 0	3 10	4 0	3 10	3 15	4 10	4 5
,, min.	4 0	4 0	4 0	4 0			
Riddell, Wm., bulbs, super.	9 17	8 0	8 2	6 8	9 5	7 10	8 0
Nether Hailes, ,, min.	10 0	8 7	6 14	8 0			
Soutar, J. G., bulbs, super.	17 10	15 6	11 17	13 0	8 17	9 10	7 14
Westhall, ,, min.	15 14	12 16	10 0	9 16			
Dundee, . . tops, super.	3 11	3 4	2 14	2 11	1 17	1 6	1 16
,, min.	3 0	2 18	2 7	1 10			

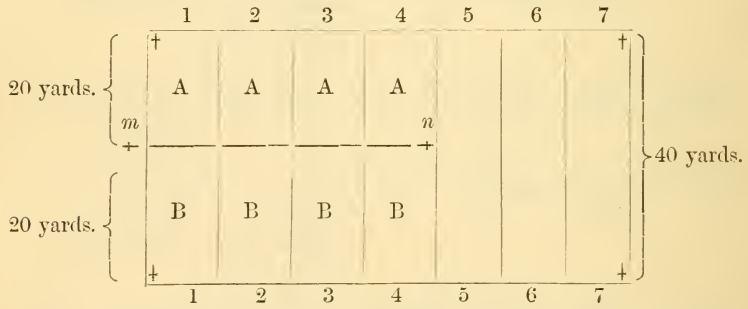
Seven-Plot Test—Turnips 1883.

General Manures in addition to Experimental Manures.	Seed and Date of Sowing.	Date of Singling and Date of Lifting.	Kind of Soil.	Inferences.	Kind of Turnip Manure suggested by the Experiments.	Per ton.
						cwt.
None.	Fosterton hybrid.. 16th June.	27th July. 6th Dec.	Light on rotten rock.	Potash beneficial. Nitrogen much needed.	Fine bone meal, Superphos. . Sulp. of ammon. Sulp. of potash,	7 6 3 4
None.	Aberdeen yellow. 20th June.	24th July. 14th Nov.	Light and dry, in very poor condition.	Mineral phosphates best. Nitrogen much needed. Potash not needed.	Finely ground Charleston phosphates or steamed bone flour, . . Sulp. of ammon. Nitrate of soda,	16 2 2
None.	Fosterton hybrid. 16th June.	18th July. 24th Nov.	Medium.	Nitrogen much needed. Soluble phosphates best. Potash little needed.	Superphos., . Sulp. of ammon. Sulp. of potash,	15 4 1
Well rotted dung in the drills.	White globe. 20th June.	31st July. 2nd Nov.	Red clay.	Mineral phosphates best. Potash not needed.	Finely ground Charleston phosphate, . Sulp. of ammon. Nitrate of soda,	12 4 4
Dung in the drills.	Fosterton hybrid. 7th June.	9th July. 26th Dec.	Sandy.	Evidence conflicting. Soluble phosphates best. Nitrogen probably washed away.	Superphos., . Fine bone meal. Horn dust, . Sulp. of ammon. Sulp. of potash.	9 6 3 1 1
Dung 15 loads per acre in drills.	Green globe. 30th June.	9th Aug. 5th Dec.	Light and porous.	Potash injurious. Soluble phosphates best. Nitrogen needed.	Superphos., . Salt of ammon. or Dissolved bones Sulp. of ammon.	16 4 18 2
Dung in Nov. 1882.	Aberdeen yellow. 2nd June.	4th July. 7th Nov.	Dry with gravel subsoil.	Evidence conflicting. Soil probably unequal.		
Bone meal.	Green top white. June.	July. Nov.	Red loam.	Mineral phosphates best. Potash beneficial. Soil probably unequal.	Finely ground Charleston phosphate, . Steamed bone flour, . . Sulp. of ammon. Sulp. of potash,	7 7 3 3
Dung 15 loads per acre in drills.	Aberdeen yellow. 11th June.	18th July. 15th Nov.	Light black moorland.	Phosphates most needed. Soluble phosphates best. Nitrogen needed. Potash not much needed.	Superphos., . Sulp. of ammon	16 4

locality of the experiments as much as possible. I still hope that many may be found willing to co-operate in this matter, and desirous of using the means afforded by the seven-plot test of informing themselves regarding the manurial wants of their land. The method of making this test is very simple, and the cost is a mere trifle. What is required is that he who uses the test should be interested in the matter, and either give it his personal attention or secure that it is undertaken by some one who is thoroughly to be depended on, for if it is not correctly done the inferences drawn from the results will be misleading, and if acted on may involve loss. The work has to be gone about in the following manner:—

Directions for Making the Plots.

Choose seven ridges, ordinary 18 feet wide ridges, on a uniform part of the field, and number them 1, 2, 3, 4, 5, 6, 7. Drive in a stake at 1 and 7, so as to mark the place well. Measure 40 yards down ridges 1 and 7, and put in other two stakes, and draw a line between them, as in the following diagram:—



Plots so made are each about one-twentieth of an acre.

Divide plots 1, 2, 3, and 4 into two equal parts, A and B, put in stakes at *m* and *n*, and draw a line between them.

The ground is now ready for the manures.

Plots 1, 2, 3, and 4 are divided in two, for the purpose of testing the two forms of phosphate, soluble and insoluble. The one half, A, receives mineral phosphate (say Charleston phosphate), ground down to the finest flour, at the rate of 3½ cwt. per acre. The other half, B, receives an equal money value of superphosphate (about 28 per cent. soluble). That will probably be a little over 5 cwt. per acre.

The only other manures are sulphate of ammonia and sulphate of potash.

The exact quantities of the ingredients applied to the various plots and half plots will be as follows:—

	1	2	3	4	5	6	7
A	Ground phos. 10 lbs. Sulphate of potash. 3 lbs. Sulphate of ammo. 3 lbs.	Ground phos. 10 lbs. ... Sulphate of ammo. 3 lbs.	Ground phos. 10 lbs. Sulphate of potash. 3 lbs. ...	Ground phos. 10 lbs. ...	Sulphate of potash. 6 lbs.		
B	Super-phos. 15 lbs. Sulphate of potash. 3 lbs. Sulphate of ammo. 3 lbs.	Super-phos. 15 lbs. ... Sulphate of ammo. 3 lbs.	Super-phos. 15 lbs. Sulphate of potash. 3 lbs.	Super-phos. 15 lbs.	Sulphate of ammon. 6 lbs.	Sulphate of ammon. 6 lbs.	No-thing.

Any one can make up a set of manures of that kind for himself. The manures for each plot and half plot should be thoroughly mixed and put into little bags, carefully labelled.

Directions for Spreading the Manures.

Choose as calm a day as possible. Lay down each bag upon its own plot as indicated by the label, and read over the labels to see that every one is right before opening the bags. Should the weather not be quite calm, the manures should be mixed with damp earth; and in any case this is to be recommended, so that the manures may be made up to something like the same bulk. There must not be the slightest blowing of the manure from one plot to another. Apply the manure broadcast.

Any member of the Society wishing to perform this experiment, and willing to communicate the result to me, will receive a schedule on which is indicated the information required. All that is necessary is that he should send me a note or a post-card with his address and the words "7-plot test" written on it, and addressed—

Dr Aitken,

8 Clyde Street,

Edinburgh.

Scheme of Experiments at the Experimental Agricultural Stations of the Highland and Agricultural Society of Scotland, commenced May 1878.

At each station there are 10 acres under experiment, divided into 40 plots of 1 rood each. The cropping is a rotation of turnips, barley, grass, or beans and oats. The chief object of the experiments is to determine the crop-producing value of the various forms of manures in common use. The manures on each plot contain 40 lbs. phosphoric acid, 30 lbs. potash, 20 lbs. nitrogen, unless otherwise indicated.

Plot.

Phosphatic Manures.

1. Bone Ash, ...
2. Bone Ash, dissolved, . .
3. Ground Coprolites, . .
4. Ground Coprolites, dissolved,
5. Bone Meal, ...
6. Bone Meal, dissolved, . .
7. Phosphatic Guano, . .
8. Phosphatic Guano, dissolved,
9. Ground Mineral Phosphate, .
10. Dissolved Mineral, . .
11. No Phosphates, . . .

} with Potash Salts and Nitrate of Soda.

12. Bone Ash alone.

Nitrogenous Manures.

13. Nitrate of Soda, . . .
14. Sulphate of Ammonia, . .
15. Horn Dust, ...
16. Dried Blood, . . .
17. No Nitrogen, . . .

} with Potash Salts and Superphosphate.

18. Nitrate of Soda alone.

Rape Cake and Cotton Cake, see Plot 35.

Potash Manures.

19. Sulphate of Potash, .
20. Muriate, . . .
21. No Potash, . . .

} with Nitrate of Soda and Superphosphate.

22. Sulphate of Potash alone.

Guanos.

23. Peruvian Guano,
24. Fish ,,
25. Ichaboe ,,

} Containing about 10 per cent. Ammonia.

26.
27. Unmanured.

Superphosphates.

28. 10 °/₀ Soluble Phosphate of Lime,
29. 25 °/₀ ,, ,,
30. 40 °/₀ ,, ,,

} with Sulphate of Ammonia and Muriate of Potash.

Various Quantities.

31. Same as Plot 1. { *a.* $\frac{2}{3}$ quantity per acre. *b.* $\frac{4}{3}$,,
32. ,, ,, 2. { *a.* $\frac{2}{3}$,, *b.* $\frac{4}{3}$,,
33. ,, ,, 14. { *a.* $\frac{2}{3}$,, *b.* $\frac{4}{3}$,,
34. ,, ,, 20. { *a.* $\frac{2}{3}$,, *b.* $\frac{4}{3}$,,
35. { *a.* Rape Dust, *b.* Cotton Cake Dust, } with Potash Salts and Superphosphate.
36.
37. Unmanured.
38. { Supersulphate of Lime, { *a.* 1 cwt. *b.* 2 cwt. } besides Manures as in Plot 7.
39. 40. } Unmanured.

APPENDIX (A).

PROCEEDINGS AT BOARD MEETINGS.

MEETING OF DIRECTORS, 7TH FEBRUARY 1883.

Present—Sir Henry J. Seton Steuart, Bart.; Mr Allan, Munnoch; Lieutenant-General Burroughs of Rousay, C.B.; Mr Cunningham, Tarbreoch; Mr Dingwall, Ramornie; Mr Drew, Merryton; Mr Dudgeon, Easter Dalmeny; Mr Scott Dudgeon, Longnewton; Rev. John Gillespie, Mouswald; Colonel Gillon of Wallhouse; Colonel Hare of Calder Hall; Mr Hope, East Barns; Mr Eliott Lockhart of Borthwickbrae; Mr Mackenzie of Portmore; Mr Mylne, Niddrie Mains; Mr Paterson, Plean Farm; Mr Shaw, Skaithmuir; Mr Smith, Stevenson Mains; Mr John Turnbull Smith, C.A.; Mr Villiers, Closeburn Hall; Mr Wilson, Wolfstar; and Dr Aitken.—Mr Cunningham in the chair.

Mr F. N. MENZIES reported apologies for the absence of Sir W. C. Anstruther, Bart., Sir A. M. Mackenzie, Bart; Sir George Macpherson Grant, Bart., M.P.; Professor Balfour; Mr Forbes of Culloden; Mr Henderson of Stemster; Mr Irvine of Drum; Mr M'Queen of Crofts; Mr Martin of Auchendennan; Mr Mollison, Dochgarroch Lodge; Mr Nicoll, Littleton; Mr Pott of Dod; Mr Walker, Portlethen; and Professor Wilson.

THE LATE SIR ARCHIBALD HOPE, BART.—Before proceeding to the business on the programme, the following resolution was unanimously agreed to:—"That the death of Sir Archibald Hope of Pinkie, Bart., having been communicated to the Directors, they desire to express their deep regret at the loss which the Society has sustained, and their sense of the cordial assistance rendered by him as an Ordinary Director.

POTATO CULTURE.—The SECRETARY read the following letter from the Privy Council for Trade, in answer to his letter of 12th January:—

"Office of Committee of Privy Council for Trade,
"January 26, 1883.

"Sir,—I am directed by the Board of Trade to acknowledge the receipt of your letter of the 12th inst., inquiring, on behalf of the Highland and Agricultural Society of Scotland, if any steps are being taken with reference to the report of the House of Commons' Committee of 1880 respecting the failures in the potato crop.

"In reply, I am to state, for the information of your Society, that under existing arrangements the Board of Trade have no authority and no funds at their disposal to carry out the experiments in regard to potato culture which are recommended in the report of the committee.

"I am to add that this Board inclines to the opinion that these investigations could be best undertaken by private associations. If it should prove any such associations are willing to make the necessary experiments themselves, but that they cannot do so for want of funds, it will rest with them to make out such a case as will satisfy the Treasury that it is a proper subject for the expenditure of public money.—I am, Sir, your obedient servant, (Signed) R. GIFFEN.

"F. N. Menzies, Esq."

Mr VILLIERS of Closeburn Hall then proposed the following resolutions, which were agreed to:—"That, in accordance with the resolution passed by the General Meeting, the Directors will offer a prize or prizes to encourage raising and introducing new varieties of potatoes. That a small committee be appointed to consider the best means of carrying this resolution into effect."

Mr HENDERSON'S DRYING APPARATUS.—The following report by the deputation appointed to visit Mr Charles J. Henderson's drying apparatus at Coltbridge was read:—Heated air is generated by a gilled stove, and by aid of a fan blower driven by a man, a continuous stream of hot air can be kept up at a temperature of 200 to 300 degrees. Mr Henderson's idea is that sheaves of corn could be dried in the field by piling the sheaves in small stacks in place of stooking them, and drawing the stove and blower from heap to heap. Mr Henderson is constructing a machine of this kind

on wheels, at an expense of about £20. He also recommends it as a means of heating churches or other large buildings. The deputation did not venture an opinion as to how it might operate in the field without seeing it tried, which Mr Henderson promised to give them an opportunity of seeing on a future occasion. They, however, thought it would be very interesting to see how a hot air-current of air, such as he can produce, would operate in drying hay or corn stacks as compared with a cold current.

MEETING OF DIRECTORS, 7TH MARCH 1883.

Present—Sir James H. Gibson-Craig, Bart. ; Sir George Macpherson Grant, Bart., M.P. ; Mr Allan, Munnoch ; Lieutenant-General Burroughs of Rousay, C.B. ; Mr Drew, Merryton ; Mr Dudgeon, Easter Dalmeny ; Mr Scott Dudgeon, Longnewton ; Mr Easson, Scones Lethendy ; Mr Elliot, Blackhaugh ; Mr Forbes of Culloden ; Mr Forman, Duncrahill ; Rev. John Gillespie, Mouswald ; Colonel Gillon of Wallhouse ; Colonel Hare of Calder Hall ; Mr Henderson of Stemster ; Mr Hope, East Barns ; Mr Irvine of Drum; Mr Eliott Lockhart of Borthwickbrae ; Mr Mackenzie of Portmore; Mr M'Queen of Crofts ; Mr Martin of Auchendennan ; Mr Mollison, Dochgarroch Lodge ; Mr Paterson, Plean Farm ; Mr Pott of Dod ; Mr Shaw, Skaithmuir ; Mr John Turnbull Smith, C.A. ; Mr Villiers, Closeburn Hall ; Professor Wilson ; Mr Wilson, Wolfstar ; and Dr Aitken.—Mr Scott Dudgeon in the chair.

Mr F. N. MENZIES reported apologies for the absence of Sir W. C. Anstruther, Bart. ; Sir Kenneth S. Mackenzie, Bart. ; Sir Henry J. Seton Steuart, Bart ; Mr Dingwall, Ramornie ; Mr Sutherland-Walker of Skibo ; Mr Walker of Bowland, C.B. ; and Mr Walker, Portlethen.

THE LATE SIR ARCHD. HOPE, BART.—A letter was read from Lady Hope of Pinkie, begging the Directors to accept her warmest thanks for the minute recording their regret at the death of her husband, and their sympathy for her.

INVERNESS SHOW, 1883.—*Stallion for District of Show.*—The SECRETARY reported that Mr Mollison, Dochgarroch Lodge ; Mr Mackenzie, Dalmore ; Mr Walker, Altyre ; and Mr Anderson of Lochdhu, had, at the competition at Glasgow on the 20th February, awarded the prize of £100, with £15 for expenses, to Mr Peter M'Robbie, Sunnyside, Aberdeen, for his bay horse "Gilderoy," aged four years and eight months, bred by Mr Duncan, Kirktoun, Deskford. The rate of service is £2 at end of season and £2 for a foal. No groom money. The horse to travel from Elgin to Tain as directed by Committee, returning from Tain to Elgin by rail once a fortnight. The horse to travel from 1st April till 15th July. A list of owners of mares to be supplied by the Committee, and in the event of any difficulty or misunderstanding arising between owner of horse and the owners of mares, the same to be settled by the Committee, whose decision shall be final.

Site for Showyard.—On a strong representation from several of the Directors connected with the Inverness district, it was agreed to hold the Show on the farm of Dalneigh, on the north side of the river Ness, instead of on Seafield farm, as had been proposed.

Inverness Farmers' Society.—Mr FORBES of Culloden intimated that the Inverness Farmers' Society had resolved to subscribe £50 in aid of the funds of the Inverness Show. On the motion of the Chairman, the thanks of the Board were voted to the Inverness Society for their donation.

Railway Arrangements.—The SECRETARY stated that he had been for some time in communication with the managers of the Scotch railway companies, and that they had agreed to meet the wishes of the Directors by assimilating the Scotch and English regulations for the conveyance of live stock and implements to and from agricultural shows as respects (1) the return of unsold live stock by passenger train at half the ordinary rates, and (2) the free conveyance of men in charge of live stock. The amended regulations will be published in the Premium Book for the current year.

EDINBURGH SHOW, 1884.—The DIRECTORS resolved to intimate in the Premium Book for the current year (1) their willingness to accept suitable champion cups or prizes for the recognised breeds of cattle, horses, and sheep in connection with the General Show of the Society at Edinburgh in 1884. For these cups or prizes all former prize animals will be eligible to compete. (2) That family or group prizes are to be offered in each of the five breeds of cattle (shorthorn, Ayrshire, polled Angus or Aberdeen, Galloway, and Highland) ; in agricultural horses, two clases ; and in each of the three breeds of sheep (blackfaced, Cheviot, and Border Leicester). The specifications of the different prizes will be intimated in January.

CLYDESDALE STUD-BOOK.—A letter was read from Mr Archibald M'Neilage, jun., Glasgow, presenting, on behalf of the Clydesdale Horse Society of Great Britain and Ireland, a copy of the fifth volume of the Clydesdale Stud-Book for the Society's library. The volume was accepted with thanks.

MEETING OF DIRECTORS, 4TH APRIL 1883.

Present—Sir W. C. Anstruther, Bart.; Sir James H. Gibson-Craig, Bart.; Sir George Macpherson Grant, Bart., M.P.; Mr Ainslie of Costerton; Mr Balfour of Balbirnie; Lieutenant-General Burroughs of Rousay, C.B.; Mr Dingwall, Ramornie; Mr Scott Dudgeon, Longnewton; Mr Dudgeon, Easter Dalmeny; Mr Easson, Scones Lethendy; Mr Elliot, Blackhaugh; Mr Forman, Duncrahill; Colonel Gillon of Wallhouse; Mr Henderson of Stemster; Mr Hope, East Barns; Mr Mylne, Niddrie Mains; Mr Nicoll, Littleton; Mr Paterson, Plean Farm; Major Rose of Kilravock; Mr Shaw, Skaithmuir; Mr J. Turnbull Smith, C.A.; Mr Campbell Swinton of Kimmerghame; Mr Villiers, Closeburn Hall; Mr Walker, Portlethen; Mr Wilson, Wolfstar; and Professor Wilson.—Mr Scott Dudgeon in the chair.

Mr F. N. MENZIES reported apologies for the absence of the Hon. G. R. Vernon; Sir Henry J. Seton Steuart, Bart.; Mr Cunningham, Tarbreoch; Mr Johnstone Douglas of Lockerbie; Mr Drew, Merryton; Mr Farquharson of Haughton; Mr Forbes of Culloden; Rev. John Gillespie, Mouswald; Mr Irvine of Drum; Mr Mackenzie of Portmore, Mr M'Queen of Crofts; Mr Martin of Auchendennan, Mr Mollison, Dochgarroch Lodge; Mr Pott of Dod; Mr Scott, Glendronach; and Mr Walker of Bowland, C.B.

INVERNESS SHOW, 1883—Letters to the conveners of the counties connected with the Show—Inverness, Elgin, Nairn, Ross and Cromarty, Caithness, Sutherland, and Orkney and Shetland—and to the Provost of Inverness, in regard to the nomination of the Local Committee, were submitted and approved of.

EDINBURGH SHOW, 1884.—The Board approved of letters being addressed to the conveners of the counties embraced in the district of the Show—Edinburgh, Haddington, and Linlithgow—and to the Lord Provost of Edinburgh—anent the auxiliary subscription.

REPORT OF TRIAL OF SEED-CLEANERS.—The following report was read:—The adjourned trial of seed-cleaning machines took place on Wednesday, 7th March 1883, in the premises of Mr Robert T. Mackintosh, seedsman, 10 Melbourne Place, Edinburgh, kindly placed at the disposal of the Society for that purpose. The judges were Messrs Thomas Mylne, Niddrie Mains; John Scott Dudgeon, Longnewton; Alexander Dudgeon, Easter Dalmeny; James Shaw, Skaithmuir; and R. Hogg Shaw, Coldstream. Mr R. T. Mackintosh also attended. Messrs John Richardson & Son, Carlisle, brought forward two machines, driven by hand, numbered 285 and 286 in catalogue of Glasgow Show—the former of which was tried with ryegrass and with clover seeds, the latter with clover seeds only. No. 285 machine is fitted with a set of three or more sieves placed in steps and stairs in the same sloping frame. This frame oscillates lengthways with a heaving sort of motion, by which a heavy-headed seed (such as wire-grass), when dropping from one sieve to another, is made to fall on its heavy head, and so pass more readily through the meshes of the sieve. This machine is chiefly intended for ryegrass seeds, and to do the chaffing, riddling, and screening at one operation. By changes of sieves and riddles, it may be made to drop other agricultural seeds, such as turnip seeds and clovers. It is light to drive, and not expensive, the price being £16, 10s. with one set of sieves and riddles (other sizes of sieves and riddles extra). The other machine is a combined machine intended to dress either corn or small seeds. It is also light, easily driven, and costs £12, 10s. The judges do not consider it nearly equal to the other as a seed cleaner, and they had no opportunity for testing it as a dresser of corn. The perennial ryegrass seed was very foul, and contained a considerable quantity of hair grass, goose grass, buttercup, Yorkshire fog, and other noxious weeds. By being passed twice through No. 285 machine, a large portion of these foreign seeds was removed, and the resulting sample of ryegrass seed was very much improved, and made comparatively clean. The clover seed operated on was old German red, very dirty and full of seeds of weeds, and neither machine was very successful with it. On the whole, the judges were of opinion that No. 285 machine made good work with ryegrass seeds, but that it will require improvement both in the blowing and in the screening apparatus to bring it up to an equality with the less simple but more effective power-driven machines used in the large seed-cleaning warehouses. They do not, therefore, consider themselves justified in awarding to it any of the prizes offered for competition at Glasgow Show. Its merit is, however, so very considerable that they recommend the Directors to make a special grant of £10 to Messrs J. Richardson & Son, in recognition of such merit, and as an encouragement to their efforts for its further improvement.

The Board confirmed the award in favour of Messrs J. Richardson & Son.

FOOT-AND-MOUTH DISEASE.—On the motion of Mr SCOTT DUDGEON, Longnewton, seconded by Mr BALFOUR of Balbirnie, the Board unanimously passed the following resolution:—"That, in view of the great spread of foot-and-mouth disease throughout the

country, and the interference to trade caused by the restrictions which its presence necessitates, the Prime Minister be asked to receive a deputation from the Society for the purpose of urging upon the Government the necessity of taking immediate steps to carry into effect the recommendations of the Royal Commission on Agriculture—'that the landing of foreign live animals should not be permitted in future from any countries as to which the Privy Council are not satisfied that they are perfectly free from any contagious disease.'"

Three members of the Board were selected to go to London; and the Secretary was instructed to communicate with the Duke of Richmond and Gordon, K.G., the President of the Society, and to arrange a deputation of members in London.

MEETING OF DIRECTORS, 2ND MAY 1883.

Present—Sir Henry J. Seton Steuart, Bart.; Mr Cunningham, Tarbreoch; Mr Dudgeon, Easter Dalmeny; Mr Scott Dudgeon, Longnewton; Mr Easson, Scones Lethendy; Mr Elliot, Blackhaugh; Mr Farquharson of Haughton; Mr Forman, Duncrahill; Rev. John Gillespie, Mouswald; Colonel Gillon of Wallhouse; Colonel Hare of Calder Hall; Mr Hope, East Barns; Mr M'Queen of Crofts; Mr Nicoll, Littleton; Mr Paterson, Plean Farm; Mr Shaw, Skaithmuir; Mr Smith, Stevenson Mains; Mr Villiers, Closeburn Hall; Professor Wilson; and Dr Aitken.—Mr Cunningham in the chair.

Mr F. N. Menzies reported apologies for the absence of Sir W. C. Anstruther, Bart.; Sir Geo. Macpherson Grant, Bart., M.P.; Mr Balfour of Balbirnie; Mr Johnstone Douglas of Lockerbie; Mr Forbes of Culloden; Mr Henderson of Stenister; Mr Irvine of Drum; Mr Eliott Lockhart of Borthwickbrae; Mr Mackenzie of Portmore; Mr Martin of Auchendennan; Mr Pott of Dod; Mr Scott, Glendronach; Mr John Turnbull Smith, C.A.; and Mr Walker, Portlethen.

Importation of Foreign Animals.—The Secretary reported that, according to previous arrangement, Lord Carlingford had received a deputation from the Society on Wednesday the 25th of April, at the Privy Council Office, on the subject of the importation of foreign live animals. The deputation, which was headed by the Duke of Richmond and Gordon, K.G., consisted of the Earl of Stair; the Earl of Kintore; the Earl of Galloway; Lord Balfour of Burleigh; Sir James Gibson-Craig; Sir Thomas Gladstone; Sir G. Macpherson Grant, M.P.; Sir Kenneth Mackenzie; Sir G. Graham Montgomery; Sir James R. Gibson Maitland; Mr Scott Dudgeon, Longnewton; Mr Elliot, Blackhaugh; Mr F. E. Villiers, Closeburn Hall; and Mr F. N. Menzies, Secretary of the Society. The Duke of Richmond, followed by Sir James Gibson-Craig, Sir George Macpherson Grant, Mr Scott Dudgeon, and Mr Elliot, stated the case for the Society, which was to urge the necessity of taking immediate steps to carry into effect the recommendation of the Royal Commission on Agriculture—"That the landing of foreign live animals should not be permitted in future from any countries as to which the Privy Council are not satisfied that they are perfectly free from any contagious disease." The substance of Lord Carlingford's reply was that, so far as in their power, they would work up to the provisions of the Act of 1878; but what the Highland Society asked was practically a request for the prohibition of the landing of live stock, which was not within the powers of the Privy Council.

Proposed Forestry Exhibition in Edinburgh.—On a letter being read from Mr Hutchison of Carlowrie, asking the Directors to name a committee of their number to join the Provisional Committee in carrying out the object of the proposed International Forestry Exhibition to be held at Edinburgh in 1884, the Directors nominated a committee, and subscribed £100 towards the guarantee fund.

In his letter Mr Hutchison explains that the objects intended by holding such an exhibition are not only to stimulate a deeper interest in scientific forestry in the public mind, and to illustrate the importance and value of woods to a country, but also to aid the movement to supply what is now an acknowledged national want, viz., a school of forestry in Scotland. Edinburgh is pre-eminently well equipped for such a school by the teaching of the professors of agriculture, botany, chemistry, engineering, and surveying, and only lacks some method of clinical instruction to utilise the Botanic Garden and Arboretum.

State of Forestry in Britain.—The following resolution was unanimously adopted:—That the Highland and Agricultural Society of Scotland, as representing the nobility, landed proprietors, and all who are interested in the management of landed property in Scotland, have learned with much satisfaction that the state of forestry in Britain is to be brought under the notice of Parliament. The Society was instituted in 1784, and incorporated by royal charter in 1787, and its exertions have for the greater part of a century been specially directed to the advancement of practical forestry by means of prizes for essays and reports on the management and

general treatment of woods and plantations. The Society has contributed largely as a body and by its members to the introduction of many valuable forest trees suitable to the climate and wants of the country. In 1871 the Society instituted a system of examination in forestry, and grants certificates to candidates of merit, as exhibited in their syllabus. The Society would therefore hail with pleasure the organisation of a system of forest education in Great Britain as a matter of the greatest importance for the instruction of forest officers, as they deem it a question of vast importance to this country as well as her various colonies.

General Meetings.—The half-yearly general meeting of the Society for the election of members and for other business was fixed to be held on Wednesday, 20th June.

Inverness Show.—Letters were submitted from the Town Clerk of Inverness, sending the names of the gentlemen appointed to act on the Local Committee of the General Show to be held at Inverness in July next; and from Mr Walter Mundell, Moy, intimating a subscription of £20, by the Northern Pastoral Club in aid of the Show.

Edinburgh Show, 1884.—The Secretary intimated that the Commissioners of Supply for the counties of Edinburgh and Linlithgow had imposed a voluntary assessment of 30s. per £1000 of valuation to raise a contribution towards the expenses of the Show in 1884; and that the Commissioners of Haddington had voted an assessment of ½d. in the pound towards the same object.

Agricultural Statistics.—A letter was read from Major P. G. Craigie, sending copy of his work on *Statistics of Agricultural Production*. The pamphlet was accepted with thanks.

MEETING OF DIRECTORS, 6th JUNE 1883.

Present—Sir James H. Gibson-Craig, Bart.; Mr Cunningham, Tarbreoch; Mr Dingwall, Ramornie; Mr Drew, Merryton; Mr Dudgeon, Easter Dalmeny; Mr Scott Dudgeon, Longnewton; Mr Easson, Scones Lethendy; Mr Elliot, Blacknaugh; Mr Farquharson of Haughton; Mr Henderson of Stemster; Mr Hope, East Barns; Mr Irvine of Drum; Mr Eliott Lockhart of Borthwickbrae; Mr Mylne, Niddrie Mains: Mr Nicoll, Littleton; Mr Paterson, Plean Farm; Mr Pott of Dod; Mr Scott, Glendronach; Mr Shaw, Skaithmuir; Mr Smith, Stevenson Mains; Mr John Turnbull Smith, C.A.; Mr Wilson, Wolfstar; Mr Walker, Portlethen; and Dr Aitken.—Mr Cunningham in the chair.

Mr F. N. Menzies reported apologies for the absence of Sir George Macpherson Grant, Bart., M.P.; Mr Johnstone Douglas of Lockerbie; the Rev. John Gillespie; Colonel Gillon of Wallhouse; Mr M'Queen of Crofts; Mr Martin of Auchendennan; Mr Mollison, Dochgarroch Lodge; Mr Villiers, Closeburn Hall; Mr Walker of Bowland, C.B.; and Professor Wilson.

Deceased Members.—Before proceeding with the business on the programme, the Board entered on their minutes resolutions expressive of their deep regret at the death of the Right Hon. Sir John M'Neill, G.C.B., and Mr Harry Maxwell Inglis of Logan Bank, and their sense of the assistance which the Society had on many occasions received from them.

International Forestry Exhibition.—The following are the names of the noblemen and gentlemen appointed by the Directors to act on the Executive Committee of the International Forestry Exhibition:—The Earl of Seafield; Lord Lovat; Sir Robert Menzies of Menzies, Bart.; Sir Herbert E. Maxwell of Monreith, Bart.; Sir James H. Gibson-Craig of Riccarton, Bart.; Dr Cleghorn, Stravithie; Mr Irvine of Drum; Mr John M'Gregor, Dunkeld; Mr Mackenzie of Portmore; and Mr F. N. Menzies, Secretary of the Society.

Inverness Show—*Hotel Accommodation*.—The headquarters of the Society were fixed to be at the Caledonian Hotel, and an agreement with Mr Macfarlane was submitted and accepted by the Board. *Closing of the Entries*.—The Secretary stated that the implement entries closed on the 1st inst., and that as Friday the 15th current was the last day for lodging certificates of stock, he would attend at the Caledonian Hotel, Inverness, on that day to receive entries and to close the list.

Chemical Department.—The Secretary reported that, in terms of the recommendations of the Committee on Publications approved by the Directors, he had arranged for the publication in separate form of the reports by Dr Aitken as contained in this year's volume of the Transactions. The pamphlet extends to about 60 pages, and contains also the whole regulations and instructions issued by the Chemical Department.

Ensilage Experiments.—Dr Aitken reported that, in the absence of Mr Mackenzie of Portmore, Mr Mylne and he had recently inspected the silo being constructed for the Society at Portmore, and gave a description of the experiment. The silo, which is now nearly completed, is a rectangular chamber 30 feet long, 13 feet deep, and 12

feet wide. It is partly dug out of a dry bank adjoining the steading, and is constructed of concrete, consisting of seven parts gravel got in the neighbourhood and one part Portland cement. The capacity of the silo is such as to contain, when full, about 100 tons of ensilage, and it is expected that the cost will not exceed 13s. per ton of capacity. The crops—consisting of grass, oats, maslin, and tares—are to be cut about the time of flowering, and stored irrespective of weather. Mr Mackenzie is constructing a silo of similar capacity at another steading to receive the produce of about 12 acres meadow grass and about 8 acres clover grass. In addition to these a silo of about 15 tons capacity will be dug on the hill farm in the form of a trench 15 feet long, 5½ feet wide, and 5 feet deep, to be filled with bog grass for the feeding of sheep. It will be simply a hole in the solid earth, dug as smoothly as possible without lining of any kind, and when it has been filled and trodden, the earth which has been taken out will be heaped on the top, to give the weight required to keep the ensilage in good condition.

MEETING OF DIRECTORS, 20TH JUNE 1883.

Present—Mr Dingwall, Ramornie; Mr Drew, Merryton; Mr Dudgeon, Easter Dalmeny; Mr Scott Dudgeon, Longnewton; Mr Elliot, Blackhaugh; Colonel Gillon of Wallhouse; Colonel of Hare Calder Hall; Mr Henderson of Stemster; Mr Hope, East Barns; Mr Irvine of Drum; Mr M'Queen of Crofts; Mr Mollison, Dochgarroch Lodge; Mr Mylne, Niddrie Mains; Mr Nicoll, Littleton; Mr Pott of Dod; Mr Shaw, Skaithmuir; Colonel Williamson of Lawers; Mr Wilson, Wolfstar; and Dr Aitken.—Mr Scott Dudgeon in the chair.

Apologies were reported for the absence of Sir George Macpherson Grant, Bart, M.P.; Sir James H. Gibson-Craig Bart.; Mr Cunningham, Tarbeoch; Mr Farquharson of Haughton; Mr Martin of Auchendennan; Mr Paterson, Plean Farm; Mr Scott, Glendronach; Mr John Turnbull Smith, C.A.; Mr Walker, Portlethen, and Mr Villiers, Closeburn Hall.

The business had reference principally to the subjects to be brought before the General Meeting of this date.

SPECIAL MEETING OF DIRECTORS, 4TH JULY 1883.

Present—The Hon. G. R. Vernon, Auchans House; Mr Dingwall, Ramornie; Mr Drew, Merryton; Mr Dudgeon, Easter Dalmeny; Mr Scott Dudgeon, Longnewton; Mr Easson, Scones Lethendy; Mr Elliot, Blackhaugh; Mr Forbes of Culloden; Mr Forman, Duncrahill; Colonel Gillon of Wallhouse; Colonel Hare of Calder Hall; Mr Hope, East Barns; Mr Irvine of Drum; Mr M'Queen of Crofts; Mr Martin of Auchendennan; Mr Mylne, Niddrie Mains; Mr Nicoll, Littleton; Mr Paterson, Plean Farm; Mr Pott of Dod; Major Rose of Kilravock; Mr Scott, Glendronach; Mr Shaw, Skaithmuir; Mr Walker of Bowland, C.B.; Mr Walker, Portlethen; Professor Wilson; Mr Wilson, Wolfstar; and Dr Aitken.—Mr Scott Dudgeon, and afterwards Mr Pott, occupied the chair.

Mr F. N. Menzies reported apologies for the absence of Sir Henry J. Seton Steuart, Bart.; Sir James H. Gibson-Craig, Bart.; Mr Cunningham, Tarbreoch; Mr Dundas of Arniston; Mr Farquharson of Haughton; Rev. John Gillespie, Mouswald; Mr Henderson of Stemster; Mr Eliott Lockhart of Borthwickbrae; Mr Mollison, Dochgarroch Lodge; and Mr John Turnbull Smith, C.A.

Inverness Show.—With reference to the resolution at last General Meeting, leaving it to the Directors to decide at their meeting to-day whether the Show at Inverness should be held or not, the Secretary read the Regulations passed by the Local Authorities of the county and burgh of Inverness.

After discussion, in which Mr Forbes of Culloden Mr Walker of Bowland, Mr Drew, Merryton, and Mr Elliot, Blackhaugh, took part, the Directors, in consideration of the Regulations by the Local Authorities of the county and burgh of Inverness, and the wishes of Exhibitors, resolved that the Show should go on.

MEETING OF DIRECTORS, 7TH NOVEMBER 1883.

Present—Mr Ainslie of Costerton; Mr Balfour of Balbirnie; Mr Cunningham, Tarbreoch; Mr Dudgeon, Easter Dalmeny; Mr Scott Dudgeon, Longnewton; Mr Elliot, Blackhaugh; Rev. John Gillespie, Mouswald; Colonel Gillon of Wallhouse; Colonel Hare of Calder Hall; Mr Henderson of Stemster; Mr Hope,

East Barns; Mr Irvine of Drum; Mr M'Queen of Crofts; Mr Martin of Auchendennan; Mr Mollison, Dochgarroch Lodge; Mr Mylne, Niddrie Mains; Mr Pott of Dod; Mr Shaw, Skaithmuir; Mr Smith, Stevenson Mains; Mr John Turnbull Smith, C.A.; Mr Villiers, Closeburn Hall; Mr Walker of Bowland, C.B.; Professor Wilson; and Dr Aitken.—Mr Cunningham, and afterwards Mr Villiers, in the chair.

Mr F. N. Menzies reported apologies for the absence of Sir Henry J. Seton Steuart, Bart.; Sir James H. Gibson-Craig, Bart.; Admiral Maitland Dougall; Mr Farquharson, of Haughton; Mr Forbes of Culloden; Mr Eliott Lockhart of Borthwickbrae; Mr Mackenzie of Portmore; Mr Murray of Dollerie; Mr Paterson, Plean Farm; Mr Scott, Glendronach; and Mr Walker, Portlethen.

The Late Mr Whyte Melville.—A letter was read from Mr J. H. Balfour, W.S., acknowledging receipt of the resolutions passed on the late Mr Whyte Melville of Bennochy, and expressing, on behalf of his relatives, their appreciation of the esteem in which he was held by the Society.

Inverness Show.—With reference to tickets which had been used by parties who were not members, the Secretary stated that in one case the ticket had been stolen and used by a man who, on being questioned at the gate, ran away. The other case was not so clear, but he would recommend the Directors not to publish the name. The tickets are marked "not transferable," and should be signed by the members before presenting them. The Directors resolved on this occasion not to report the names of the members whose tickets had been presented by others, but they expressed a strong opinion that members should be more careful of their tickets, and that if these disgraceful transferences continue, strong steps would have to be taken to prevent them.

Nomination of Directors by Show Districts.—The Secretary reported that the following members had been nominated and recommended to the Board to act as Ordinary Directors, in terms of the regulations:—Mr Robert Gardiner of Rottearns, Chapel Bank—Perth district; Mr Robert Paterson of Birthwood—Glasgow district; Mr James Murray, Catter House—Stirling district; Mr John Marr, Cairnbrogie—Aberdeen district; Mr R. G. Wardlaw Ramsay of Whitehill—Edinburgh district; Mr Jonathan Middleton, Clay of Allan—Inverness district; Mr Niven Matthews, Whitehills—Dumfries district; Mr James T. S. Elliot, yr. of Wolfelee—Kelso district.

Office-Bearers and Directors.—It was remitted to the following committee to prepare a list of Office-bearers and Directors, and to submit it for consideration at the December meeting:—Lord Polwarth, Sir Alexander Muir Mackenzie, Sir James H. Gibson-Craig; Mr Cunningham, Tarbreoch; Mr Dingwall, Ramornie; Mr Scott Dudgeon, Longnewton; Rev. John Gillespie, Mr Pott of Dod; Mr Eliott Lockhart of Borthwickbrae; Mr Mackenzie of Portmore; Mr Villiers, Closeburn Hall; Mr Martin of Auchendennan; Mr Balfour of Balbirnie; Mr Dudgeon, Easter Dalmeny; and Mr Mollison, Dochgarroch Lodge.

General Shows.—*Edinburgh*, 1884.—The reports of the Committees on General Shows, Machinery, and Highland Industries, suggesting the premiums to be offered at the Edinburgh Show next year, was under the consideration of the Board, and after being again before the Board will be submitted to a meeting of members to be held next month.

Glasgow Show, 1882.—The premiums awarded for shorthorn cows, two-year-old shorthorn heifers, two-year-old Galloway heifers, and mares in foal (payment of which had been suspended till birth of produce was certified) were reported to have been finally decided as follows:—Shorthorn Cows—1, Mr Mitchell, Auchnagathle, "Hawthorn Bud;" 2, the late Mr Baillie of Dochfour, "Belle of Albion;" 3, no award. Two-year-old Shorthorn Heifers—1, Mr Mitchell, Auchnagathle, "Aurora;" 2, Mr M'William, Stoneytown, "Golden Wreath:" 3, George Bruce, Aberdeen, "Emma, 2nd." Two-year-old Galloway Heifers—1, Mr M'Cowan of Newtonairds, "Nundina 3rd of Drumlanrig" (3822); 2, Mr Jardine of Castlemilk, M.P., "Lady Nancy 2nd" (3981); 3, Mr Jardine Paterson of Balgray (4183). Mares in Foal—1, Mr Dykes. Kipps, "Susy;" 2, Mr Waddell of Inch' "Cherry;" 3 and 4, no award.

District Competitions.—It was also reported that the premiums awarded for mares in foal in the district of Cupar and St Andrews and Central Strathearn had been ultimately adjudged as follow:—Cupar and St Andrews—1, Mr Blyth, Bambreich; 2. Mr Millie, Kilmaron; 3, Mr Dingwall, Ramornie. Central Strathearn—1, Mr Gardiner, Chapel Bank; 2, Mr Dow, Balmanno; 3, Mr Gardiner, Chapel Bank.

Presentation.—A letter was submitted from Mr A. Stephen Wilson, North Kinmundy, Aberdeenshire, presenting copy of his work, entitled *A Bushel of Corn*, and to mark their appreciation of his work the Directors had at a former meeting awarded the writer a gold medal.

Miscellaneous Remits—To the Reading Committee, to report on papers lodged in 1883; to the Publication Committee, to revise the list of subjects for 1884; to the Committees on District Shows and on Cottages and Gardens, to revise the awards of 1883, and consider the applications for 1884.

MEETING OF DIRECTORS, 5TH DECEMBER 1883.

Present—Sir G. Graham Montgomery, Bart.; Sir James H. Gibson-Craig, Bart.; Mr Allan, Munnoch; Mr Balfour of Balbirnie; Mr Cunningham, Tarbreoch; Mr Dingwall, Ramornie; Mr Drew, Merryton; Mr Dudgeon, Easter Dalmeny; Mr Scott Dudgeon, Longnewton; Mr Easson, Scones Lethendy; Mr Elliot, Blackhaugh; Rev. John Gillespie, Mouswald; Mr Henderson of Stemster; Mr Hope, East Barns; Mr Irvine of Drum; Mr Eliott Lockhart of Borthwickbrae; Mr Mackenzie of Portmore; Mr M'Queen of Crofts; Mr Mylne, Niddrie Mains; Mr Nicoll, Littleton; Mr Pott of Dod; Mr Shaw, Skaithmuir; Mr Smith, Stevenson Mains; Mr John Turnbull Smith, C.A.; Mr Villiers, Closeburn Hall; Mr Walker, Portlethen; Mr Walker of Bowland, C.B.; Professor Wilson; and Dr Aitken.—Mr Cunningham in the chair.

Mr F. N. MENZIES reported apologies for the absence of Sir Henry J. Seton Steuart, Bart.; Sir W. C. Anstruther, Bart.; Sir C. E. F. Stirling, Bart.; Sir George Macpherson Grant, Bart., M.P.; Mr Johnstone Douglas of Lockerbie; Colonel Gillon of Wallhouse; Colonel Hare of Calder Hall; Mr Mollison, Dochgarroch Lodge; Mr Murray of Dollerie; Mr Paterson, Plean Farm; Mr Scott, Glendronach; and Mr Wilson, Wolfstar.

BOARD AND GENERAL MEETINGS.—The Board Meeting for January 1884 was fixed to be held on the 9th instead of the 2nd, and the anniversary General Meeting on the 16th of that month.

CATTLE DISEASE.—On the motion of Mr SCOTT DUDGEON, seconded by Mr Dingwall, the following resolution was agreed to:—"The continued prevalence of foot-and-mouth disease, and the large increase in the number of outbreaks throughout the United Kingdom since the Highland and Agricultural Society's deputation waited upon the President of the Council in the end of April, compel the Directors of the Society again to urge upon the Government the necessity of no longer delaying to give effect to the recommendation of the Royal Commission on Agriculture—'that the landing of foreign animals should not be permitted in future from any countries as to which the Privy Council are not satisfied that they are perfectly free from contagious disease.' The past experience of the working of the Contagious Diseases (Animals) Act, 1878, as administered by the Privy Council and Local Authorities, has proved it to be a complete failure in preventing the introduction of disease from abroad, and the constant recurrence of alarming and wide-spread outbreaks of foot-and-mouth disease throughout the kingdom; while, from the want of uniformity in the restrictions enforced by the various Local Authorities and the necessity which exists for their almost constant imposition, these restrictions have become intolerable to the breeders and feeders of live stock, and are interfering most prejudicially in the adequate supply of butcher meat and dairy produce to the British public."

AMSTERDAM AGRICULTURAL EXHIBITION.—The following letter in regard to the Agricultural Exhibition to be held at Amsterdam next year, was read, and the Secretary stated that the programme could be seen on application at the Society's Office, No. 3 George IV. Bridge:—

"Science and Art Department, London, S.W.
"*Amsterdam Agricultural Exhibition.*

"Sir,—The Lords of the Committee of Council on Education have received from the Secretary of State for Foreign Affairs a communication announcing that an Agricultural Exhibition, under the patronage of His Majesty the King of the Netherlands, will be held at Amsterdam by the United Netherlands Agricultural Association from August 25 to September 6, 1884. I am to suggest that the intention to hold this exhibition should be communicated to the members of your Society, and to such other persons as would be interested in the subject. I enclose a copy of the programme received from the Foreign Office; and you will observe that further particulars of the exhibition may be obtained from the Secretary of the Executive Committee, P. F. L. Waldeck, Esq., Loosdimnen, near the Hague, Netherlands.—I am, Sir, your obedient servant, (Signed) G. F. DUNCOMBE.

"The Secretary of the Highland and Agricultural Society of Scotland."

HOOSE OR HUSK.—The SECRETARY read the following letter from Mr Williams, and a hope was expressed that gentlemen having animals affected with the disease Hoose or Husk would communicate either with the Secretary of the Society or Mr Williams:—

"New Veterinary College,
"Edinburgh, 4th December 1883.

"Sir,—Having recently read and heard that drugs may be introduced directly into the windpipe of animals without doing harm, I should very much like—should I have the opportunity—to try the efficacy of some drugs in the treatment of 'Husk or Hoose.' I may explain that husk is a disease chiefly affecting calves and lambs; it is due to the presence of worms in the lungs, which cause a large amount of irritation, and so cause bronchitis and pneumonia, resulting too frequently in death. Husk or hoose occurs more frequently in England than in Scotland, but even in the latter country it

causes annually a heavy loss. The disease is ordinarily treated by the administration (by the mouth) of anti-parasitic medicines, which may in the earlier stages cause a cure, but when the disease is much advanced the ordinary administration of drugs is found of no avail. If you know of any one whose animals are so affected, and if he be willing, I would gladly avail myself of the opportunity of attempting a cure—I am, &c., (Signed) W. O. Williams, V.S., and M.R.C.V.S.

"F. N. Menzies, Esq."

Argyll Naval Fund.—On the recommendation of the Committee in charge of this Fund, it was resolved to place on the list of recipients Mr Archibald Peers MacEwan, at present on board the "Britannia," in room of Mr Charles Hope Dundas, who has been promoted to the rank of lieutenant.

Presentation.—The Secretary submitted a copy of *Woods, Forests, and Estates of Perthshire*, by Thomas Hunter, editor of the *Perthshire Constitutional and Journal*, presented to the Society's library by the author. The work was accepted, and the Secretary was instructed to thank the donor.

MEETING OF DIRECTORS, 9th JANUARY 1884.

Present—Sir George Macpherson Grant, Bart., M.P.; Sir James H. Gibson-Craig, Bart.; Mr Dingwall, Ramornie; Mr Johnstone Douglas of Lockerbie; Mr Drew, Merryton; Mr Dudgeon, Easter Dalmeny; Mr Scott Dudgeon, Longnewton; Mr Elliot, Blackhaugh; Mr Forman, Duncrahill; Rev. John Gillespie, Mouswald; Colonel Gillon of Wallhouse; Colonel Hare of Calder Hall; Mr Henderson of Stemster; Mr Hope, East Barns; Mr Mackenzie of Portmore; Mr M'Queen of Crofts; Mr Paterson, Plean Farm; Mr Shaw, Skaithmuir; Mr Smith, Stevenson Mains; Mr J. Turnbull Smith, C.A.; Mr Villiers, Closeburn Hall; Mr Walker of Bowland, C.B.; Mr Wilson, Wolfstar; and Dr Aitken.—Mr Scott Dudgeon, and afterwards Mr Mackenzie, in the chair.

Mr F. N. Menzies reported apologies for the absence of Sir Henry J. Seton Steuart, Bart.; Sir C. E. F. Stirling, Bart.; Sir W. C. Anstruther, Bart.; Mr Farquharson of Haughton; Mr Forbes of Culloden; Mr Eliott Lockhart of Borthwickbrae; Mr Martin of Auchendennan; Mr Murray of Dollerie; Mr Nicoll, Littleton; Mr Pott of Dod, Major Rose of Kilravock; Mr Scott, Glendronach; and Mr Walker, Portlethen.

Office-Bearers.—The Secretary reported that the names of the noblemen and gentlemen to be proposed by the Directors at the General Meeting on the 16th curt., to fill the vacancies in the list for 1884, had been published in terms of the Charter.

Agricultural and Forestry Examinations.—The examinations in agriculture and forestry were fixed to be held on the 24th, 25th, and 26th March, candidates being required to enter their names before the 10th March with the Secretary.

MEETING OF DIRECTORS, 16th JANUARY 1884.

Present—Sir C. E. F. Stirling, Bart.; Sir Henry J. Seton Steuart, Bart.; Mr Allan, Munnoch; Mr Balfour of Balbirnie; Mr Dingwall, Ramornie; Admiral Maitland Dougall of Scotscraig; Mr Scott Dudgeon, Longnewton; Mr Easson, Scones Lethendy; Mr Elliot, Blackhaugh; Mr Farquharson of Haughton; Colonel Gillon of Wallhouse; Colonel Hare of Calder Hall; Mr Hope, East Barns; Mr Henderson of Stemster; Mr Irvine of Drum; Mr Mackenzie of Portmore; Mr Martin of Auchendennan; Mr Nicoll, Littleton; Mr Paterson of Birthwood; Mr Pott of Dod; Mr Shaw, Skaithmuir; Mr Smith, Stevenson Mains; Mr J. Turnbull Smith, C.A.; Mr Villiers, Closeburn Hall; Mr Wilson, Wolfstar; and Dr Aitken.—Mr Scott Dudgeon in the chair.

Mr F. N. Menzies reported apologies for the absence of the Marquis of Lothian; the Earl of Dalkeith; the Earl of Mar and Kellie; the Earl of Haddington; Sir George Macpherson Grant, Bart., M.P.; Rev. John Gillespie; Mr M'Queen of Crofts; Mr Mollison, Dochgarroch Lodge; Mr Walker of Bowland, C.B.; Mr Walker, Portlethen; and Professor Wilson.

The business had reference to the subjects to be brought before the General Meeting of this date.

PROCEEDINGS AT GENERAL MEETINGS.

GENERAL MEETING, 20th JUNE 1883.

Mr Scott Dudgeon, Longnewton, in the chair.

New Members.—155 noblemen and gentlemen were duly elected as members of the Society.

Inverness Show.—Colonel Gillon of Wallhouse, chairman of the Committee on General Shows, reported that the meeting at Inverness would be held on the 24th, 25th, 26th, and 27th July. The entries closed on the 15th, and the following is a comparative statement of the head of stock and number of implements :—

	1883.	1874.
Cattle,	354	391
Horses,	172	175
Sheep,	375	477
Swine,	33	48
Collie Dogs,	26	12
Poultry,	304	451
Implements,	1280	1161

As the meeting is aware, a special Committee was appointed on 1st November last to consider suggestions by Colonel Williamson of Lawers, and the improvement of the arrangements connected with the General Shows of the Society ; and on the recommendation of that Committee, the Directors agreed as follows :—

1. That to assist and advise with the Secretary, a Show Committee shall be appointed annually, with whom collectively shall rest the sole management and responsibility for the arrangement and conduct of the General Show. This Committee shall consist of six members, each of whom at his first appointment shall be, or recently have been, a Director of the Society, and shall be eligible for re-election. Their duties shall be divided as follow :—Four stewards of stock and two stewards of implements—1st, steward of horses ; 2nd, steward of cattle ; 3rd, steward of sheep, pigs, &c. ; 4th, steward of forage ; 5th and 6th, stewards of implements. The stewards shall have an office in the committee room, where they shall attend at stated hours to communicate with exhibitors. 2. That the parade of horses and cattle shall be under the control of the stewards of these departments. 3. That a half-day's forage be allowed all stock received into the yard on the day previous to the opening of the show. 4. That no night accommodation for attendants on stock be provided. 5. That all protests shall be accompanied by the deposit of £2, 2s ; and if not sustained, the sum to be forfeited to the Society at discretion of Board. 6. That the charge for open space in implement yard shall be increased from 1s. to 2s. for members, and from 2s. to 3s. to non-members, per running foot of 20 feet deep.

The following have agreed to act as stewards :—Lord Arthur Cecil—Horses. Sir James H. Gibson-Craig, Bart.—Cattle. Rev. John Gillespie—Sheep, pigs, &c. Mr Forbes of Culloden—Forage. Mr Shaw, Skaithmuir, and Mr Scott Dudgeon—Implements.

The following gentlemen have been named by the Commissioners of Supply to represent the counties embraced in the district of the Show in the Local Committee :—

Inverness-shire.—Captain Fraser of Balnain ; The Mackintosh of Mackintosh ; J. E. B. Baillie of Dochfour ; T. R. Biscoe of Newton ; E. H. Wood of Raasay ; Major-General Warrand, The Bught ; Major Grant, Drumbuie ; John Peter, Croyard. *Elginshire.*—Captain Dunbar Brander of Pitgaveny ; James Grant Peterkin of Grange ; George R. Mackessack, yr. of Ardgye ; Thomas Balmer, Fochabers ; John Smith, Inverallan House ; William Brown, Earlsmill. *Nairnshire.*—Colonel Clarke of Achareidh ; Robert Anderson of Lochdhu ; A. C. Hebden, Nairn. *Ross-shire.*—Colonel Davidson of Tulloch ; George Inglis of Newmore ; Major Warrand, Ryefield House ; Capt. Munro, yr. of Fowlis ; Allan R. Mackenzie, yr. of Kintail ; Colin Camerom, Balnakyle. *Cromarty.*—D. M. Ross, yr. of Cromarty ; Colin Lyon Mackenzie of St Martins. *Sutherland.*—Thomas Barclay, Skelbo Castle ; Patrick P. Sellar, Culmailly ; George G. Clarke, Erriboll ; William Mitchell, Ribigill ; Evander Macivor, Scourie ; John Crawford, Tongue. *Caithness.*—Alexander Henderson of Stemster, John Miller of Scrabster ; William Mackay, Melness ; James Macbeath, Brims ; A. W. Henderson of Bilbster, Garden Duff-Dunbar of Hempriggs. *Orkney.*—Simon Leitch, Elwick Bank ; Robert Menzies Traill, Hobbister. *Shetland.*—John

Bruce, yr. of Sumburgh; Lewis Francis Umphray Garriock of Berry. *Town of Inverness.*—Provost Fraser, Bailie William Smith, Bailie William Macbean, Bailie James Melvin, Bailie Matthew Elliot.

At a meeting of the Local Committee held at Inverness on the 15th inst., the following sub-committees were appointed:—*Admission to Parade Gallery*—Mr Mackenzie, yr. of Kintail, convener; Mr Anderson of Lochdhu, and Mr Cran, Kirkton. *Forage Arrangements*—Mr Ross, yr. of Cromarty, convener; Mr Paterson, Balrobert. *Police*—The Mackintosh of Mackintosh, convener; Mr Biscoe of Newton; Major-Gen. Warrand, Bught; the Provost of Inverness. *President's Dinner*—Lord Lovat, convener; Major Warrand, Ryefield; Colonel Davidson of Tulloch; Captain Fraser of Balnain. *Ball*—Brodie of Brodie, convener; Sir Kenneth Mackenzie, Bart.; Major Rose of Kilravock; Mr Mackessack, yr. of Ardgye; Capt. Lyon Mackenzie of St Martins; Mr Dougall, Inverness; Mr Hebden, Nairn; Mr Duncan Shaw, W.S., with power to add to their number. *Accommodation of Strangers*—The Provost of Inverness, convener; Bailie Melvin; Mr James Anderson, Inverness; Mr Dougall, Inverness; Mr Cameron, Fettes. The Directors' and Judges' Dinners will be held on the evenings of Monday and Tuesday; and the President's Dinner, which is open to members, will take place on Wednesday evening. The headquarters of the Society will be at the Caledonian Hotel. Tickets for admission to the yard have been sent to all members residing in the United Kingdom whose addresses are known, and on no account will duplicates be issued. All members not producing their tickets must pay at the gate, and the admission money will not be returned.

On giving in this report,

Colonel Gillon of Wallhouse, said he regetted very much to state, what he had never had to do during the many years he had been a Director of the Society, that it was very doubtful indeed whether the Show on which he was reporting would take place. From the numerous outbreaks of foot-and-mouth disease over the country, it seemed very doubtful whether people would send their stock through districts where there were restrictions against the transport of cattle. Even if these were waived, which he believed they were willing to do in the neighbourhood of Inverness, yet, if they once got to the Show, he did not very well see how they were to get back again, because disease might break out there, and there would be great difficulties in the way. The Directors, at a meeting that forenoon, had discussed the matter most seriously, and came ultimately to the decision that it would be rather rash to decide that day as to whether there should be any Show or not at Inverness. They therefore adjourned to that day week, when from the condition of the country then they would be better able to give a decision as to whether the Show should be held or not. They had heard that day that foot-and-mouth disease had broken out in the market of Edinburgh. They did not know whether that was true or not, but they were well aware that it had broken out very recently in East Lothian and West Lothian—for the second time, he believed, on one farm in East Lothian. There was also an outbreak reported from Forfarshire, so that it seemed there was a good deal of disease in the country. The taking of cattle and sheep there would thus be risky, and the Directors had come to the conclusion that if cattle, sheep, and swine were excluded from the Show none should take place, as the entries of horses would not be large; indeed, very few were generally shown at Inverness.

The Chairman said he was sure that the Society joined with the Directors in lamenting that there was any doubt about the holding of the Inverness Show. But in the circumstances, he thought the meeting would support the view the Directors took in postponing a definite decision on the matter for another week. To come to a decision to-day was very like legislating in a panic. In another week they might be able to arrive at a calm and just decision.

Mr Mollison, Dochgarroch Lodge, urged that in considering this matter the Directors and the Society should not overlook the interests of exhibitors. Great preparations were being made for the Show, and he did not think three outbreaks of foot-and-mouth disease in Scotland—which were all that could be mentioned at that moment, unless there was a case in the market that day—were sufficiently alarming to warrant even the Directors considering the matter. These outbreaks were a long way from Inverness, and they must not forget that those who were exhibiting stock were exhibiting valuable animals, and were ready as a rule to take the greatest precautions that they should not come in contact with disease or diseased centres. In the transmission of stock to the Show the owners of animals would see that the trucks and carriages in which they were conveyed were thoroughly cleansed and the greatest possible care was taken. He therefore did not think that the present meeting should indicate its voice in regard to the matter. If there were any fresh outbreaks before the day on which the Directors met they could then pronounce whether there was to be a Show at Inverness. Speaking as a member of the Local Authority of Inverness, he was sure every means would be taken to prevent infection, and these, amongst others, would include the suspension of sales and markets within a certain radius of the town

for at least fourteen days prior to the Show, lest any mishap should occur. It would be a most unfortunate thing if the Directors were to see it necessary to decide that no Show be held at Inverness unless something more alarming occurred between the present meeting and that day week. He would therefore propose that unless any fresh outbreak occurred in that interval the Show at Inverness be held.

Mr Walker of Bowland, C.B., asked what restrictions there were at present at Inverness with reference to the transmission of animals from other districts of the country?

Mr Menzies (Secretary), read an excerpt minute of the Local Authority of Inverness, of date 15th June, which bore that the Lord-Lieutenant brought under the notice of the meeting a communication from the Secretary of the Highland and Agricultural Society, suggesting a modification of the existing rule with reference to cattle entered for the Society's Show at Inverness. According to the existing rules, no animals could be transmitted from the south, and the meeting resolved that unless a fresh outbreak of disease in the meantime occurred the cattle entered for the Inverness Show should be admitted to the county with a licence or certificate, and the clerk was authorised to grant such licence, and a committee appointed to take the necessary precautions for admission of animals to the Show, having in view the regulations adopted by the Royal Agricultural Society with reference to the York Show.

Mr Walker suggested that the Local Authority at Inverness should take into consideration whether they would not absolutely prohibit during the week of the Show the importation into the district of any animal brought from a place within ten miles of an infected area or place. That would exclude from Inverness the possibility of any animals going from East or West Lothian or Forfarshire within ten miles of a place where disease existed.

Mr Mollison said he thought he would be quite safe in answering Mr Walker that before the meeting of Directors was held next week the Local Authority of Inverness would have fresh restrictions made to meet what Mr Walker proposed, because he thought it perfectly reasonable.

Mr Smith, Whittinghame, thought they were much indebted to Mr Mollison for giving the Society the opportunity for this discussion. The exhibitors, he thought, would not only take care to look after their stock, but if unfortunately the disease were to spread, he should question whether they would send their stock on, more especially if there was the least fear that it would be affected. He thought, however, it was premature now to take such a decided step as at once to give up the idea of the Show. They did not know what might come out of the future; but in the meantime he did not think that it could inconvenience any one to let the arrangements go on. If things came to the worst, the exhibitors and others must just be contented to take circumstances as they came. He thought they should allow things to take their course. (A Voice—"How long?") He should say to the last hour, or, at all events, last week. (Cries of "No, no.") He deprecated panics. He thought that to some extent their local authorities had been acting under them. They had done perhaps what many might think proper, but what had proved to be a great annoyance and inconvenience, and undoubtedly a considerable loss to many owners of stock. In the meantime, he thought Mr Mollison's suggestion was well worthy of the support of the Society, and he seconded the motion.

Mr Howatson of Glenbuck, asked if there was much money expended on the Show-yard arrangements up to this date? If there was any likelihood of the Show being stopped, now was the proper time.

Mr Menzies stated that he had been north, and would not allow the contractor to commence work until this morning. He was entitled to begin on the 9th June, and he had now about a half of the wood on the ground. At the present moment the loss to the Society would be, he had no doubt, somewhere between £400 and £500. He had meantime instructed the contractor to go on with the work which would not require any breakage, and he had done the best in his power to prevent any expense being incurred which could be avoided. The contractor distinctly stated that he could not put up the erections if he were to begin later, because if the weather broke he could not possibly finish in time.

Mr Mollison thought it would be an unfortunate thing if the holding of the Show should turn upon the matter of expense. There was a strong feeling that the Society was a little too saving in that way. A large proportion of their revenue came from the north, and he was confident that if it appeared in any way that the Show was put off on account of the expense, it would be an unfortunate thing for the welfare of the Society.

Mr Walker quite agreed with Mr Mollison that the question of expense to the Society was of no moment whatever. What they had to do with was the safety of the stock of the exhibitors and of the country.

The Chairman then stated that he understood Mr Mollison's motion to be that unless there were outbreaks occurring between this and the 1st July, this meeting resolved that the Show should be held.

Mr Henderson of Stemster stated that what he understood was intended by Mr Mollison was a recommendation to the Directors, who were to consider whether it would be prudent to go on with the Show or not.

Mr Walker thought it better to leave the matter to the Directors as a recommendation. Before this day week the Local Authority would be able to communicate to the Directors the restrictions they had made. When these were received he would be quite prepared to go the length of the motion; but at present they were acting on uncertainty, because they did not know that that view would be endorsed by the Local Authority of Inverness.

Mr Pott of Dod pointed out that if the Directors met on the 27th, three days would elapse before the 1st July, in which an outbreak might occur.

Colonel Williamson of Lawers asked, supposing prosperity surrounded them on all sides, what would be the probable gain or probable loss in connection with the Show at Inverness?

Mr Menzies—Mr Mollison says we will have £2000 to the good. I asked him if he would guarantee that?

The Chairman said that, with all deference to Mr Williamson, he thought they had come pretty unanimously to the conclusion that expense was not to be considered; and he thought it better that it should not be brought up now.

Mr Mollison suggested, as they might be limited in time in getting the guarantee which Mr Walker properly asked for, it mght be better to put off the deliberation and decision of the Directors for an additional week. By that time there was no doubt they would be able to put in the hands of the Directors the assurance which Mr Walker asked for.

It was then agreed to leave the matter in the hands of the Directors until the first Wednesday of July, to which day the meeting of Directors would stand adjourned.

Edinburgh Show, 1884.—Colonel Gillon then submitted the list of classes of stock for the Edinburgh Show next year, and stated that the Directors were willing to accept on this occasion, the centenary of the Society, suitable champion cups or prizes for the recognised breeds of cattle, horses, and sheep, for which all former prize animals would be eligible to compete. He pointed out that there would be family or group prizes in all the breeds of cattle, as well as in the class of draught horses, and in the blackfaced, Cheviot, and Border Leicester breeds of sheep, and that the animals to form these family or group prizes would be announced in January. The Commissioners of Supply for the counties embraced in the district of the Show—Edinburgh, Haddington, and Linlithgow—had all imposed voluntary assessments to raise contributions towards the expenses of the Show.

Potato Culture.—Mr Dudgeon, Easter Dalmeny, reported that the Directors had appointed a Special Committee to carry out the resolution of last General Meeting, and that on their recommendation the Board resolved to offer £50 as a prize or prizes for the best variety of disease-resisting potatoes which had never been sold or offered for sale, such variety being a seedling of not less than five years' growth. Each competitor was required to send not less than one stone of such variety to the Society, under whose superintendence they were to be tested as to their disease-resisting properties for one year, at the expiration of which time the prizes are to be awarded. The produce of the potatoes is to belong to the owners; but no prize will be awarded to any variety showing any symptom of disease. In accordance with these regulations five competitors lodged samples, which have been planted on ground on the farm of East Barns, near Dunbar, kindly granted for the purpose by Mr Hope.

Importation of Foreign Live Animals.—The Chairman gave an account of the proceedings connected with the subject of the importation of foreign live animals. He said that the Directors were unanimously of opinion that the matter of security to their flocks and herds from infection and disease was a matter of very great importance; and they resolved accordingly, after considering the matter carefully, to support the action which the Royal Agricultural Society of England and a number of other influential agricultural societies had taken in appointing a deputation to wait upon the President of the Council, to urge upon the Government the importance of preventing, as far as they possibly could, the importation of disease from abroad. He then gave an account, which has already appeared, of the meeting of a deputation with Lord Carlingford on the subject. The Society had not rested since the action they took on that occasion. They considered the matter of the utmost importance to agriculture, and they had taken other means to have as wide an expression of opinion on the subject from persons in Scotland as possible. Accordingly, they addressed a circular to all the local authorities and agricultural associations in Scotland to ask them to express their views on the matter; and most of them were no doubt aware that in consequence of that action a meeting was to be held in Edinburgh next week, when deputies from various agricultural societies were to take up the subject. The Society had also addressed a circular to a great number of the cattle salesmen and cattle dealers in Scotland connected with the home trade, asking to take some action in expressing an

opinion as to the evils arising from the introduction of disease. To that circular they had had a very favourable reply.

AGRICULTURAL EDUCATION.—Mr MYLNE, Niddrie Mains, reported that the annual examination of candidates for the Society's diploma and certificates in agriculture, was held on the 26th, 27th, and 28th March. The number of candidates who presented themselves was eighteen. The examination resulted in five candidates passing for the diploma, seven for the first, and three for the second class certificate, viz. :—*For Diploma*—J. Bardgett ; Giris Chandra Basu ; Herbert W. Hamilton ; John H. Tiffen ; Henry A. Watson. *For First-Class Certificate*—Walter de Hoghton Birch ; Alexander H. Gibson ; Arthur H. Kerr ; P. Lauderdale Maitland ; John Malcolm ; Henry B. Mayne ; Robert R. Peter. *For Second-Class Certificate*—Herbert G. Aylen ; Robert J. Campbell ; John K. Ledingham. Mr Mylne also mentioned that a letter had been recently received from Sir Francis R. Sandford, Secretary of the Scottish Education Department, sending copy of the Scotch Code for 1883, showing that the principles of agriculture are now included in the list of specific subjects for which a grant is offered ; and that agriculture is there recognised by the Department as a subject of instruction for pupil-teachers and scholars. He further stated that the two prizes of £6 and £4 given by the Society in books to the class of agriculture in the University of Edinburgh had been awarded, after special examination, to—1, Alex. H. Gibson ; 2, Herbert W. Hamilton.

FORESTRY DEPARTMENT.—Dr CLEGHORN reported that the examination of candidates for the Society's certificates in forestry was held at the same time as the agricultural examinations. Four candidates presented themselves, but only one second-class certificate was awarded—viz., to Peter Reid. He also stated that a proposal to hold an International Forestry Exhibition in Edinburgh next year had been for some time before the public, and that, at the request of those in charge of the matter, the Directors had named ten gentlemen to join the Provisional Committee in carrying out the object in view, all of whom have agreed to act. Towards the guarantee fund the Directors had subscribed £100.

CHEMICAL DEPARTMENT.—Dr AITKEN then gave in his report. After stating, regarding the progress of the work of the chemical department, that the experiments at the Society's station have been successfully laid down, he said—"A large number of schedules have been sent out to farmers in various parts of the country, describing a simple method of testing the fertility of the soil, and so enabling farmers to discover what manurial ingredients their soils most require. It is a small experiment applied to the turnip crop, costing almost no money and very little trouble, and is capable of yielding information which will enable those who try it to effect some economy in the manuring of their land. The silo at Portmore, whose construction was sanctioned by the Society at its last meeting, has now been built. It is made of concrete, and has a capacity of about 170 cubic yards, and is capable of accommodating about 100 tons of ensilage. The crops to be put into it are of several kinds, viz., about 8 tons clover grass ; about 20 tons natural grass, cut from plantations and roadsides ; about 12 tons of green oats, partly after lea and partly sown out ; about 30 tons of corn and peas ; and about 30 tons of tares. These will all be cut and siloed at their greenest, and kept during the winter under a pressure of about 200 lbs. per square foot of surface. In addition to this silo, Mr Mackenzie is contsructing another of slightly larger dimensions to store the produce of 12 acres of natural grass and 8 acres of clover grass, and also a silo on the hill farm consisting of a pit dug in the dry earth, and intended to hold about 10 tons of bog grass. The purpose of these experiments is not only to test the suitability of silos for the preservation of fodder crops grown in this part of the country, but also to furnish information regarding the value of fodder so preserved compared with that of the crops at the time of cutting, and with the same when made into hay. Intimation will be given of the time when the silos are to be filled, so that any members of the Society who are interested in the experiment may have an opportunity of witnessing the operation."

THE TRANSACTIONS.—Mr IRVINE of Drum laid on the table vol. xv. (fourth series) of the Transactions.

NEW VETERINARY COLLEGE, LEITH WALK.—Colonel GILLON said that in the absence of Mr Hope he had been asked, as a member of the Veterinary Committee, and also as an old convener, to inform the meeting that a new Veterinary College was being built in Leith Walk, and that it would be opened on the 24th of October next. Principal Williams had asked that the Directors should send a deputation to the opening. As there would be no meeting of the Directors at that time, he thought the best way would be to ask the Secretary to arrange for a deputation attending. (Agreed.)

DESTRUCTION OF WEEDS.—Mr MACFIE of Gogar called the attention of the Directors to the advisability of proprietors and others destroying nettles and noxious weeds by the sides of roads and banks of rivers.

On the motion of Colonel GILLON, a vote of thanks was given to the chairman, and the proceedings terminated.

GENERAL MEETING AT INVERNESS, 25TH JULY 1883.

The Right Hon. Lord LOVAT, Vice-President, in the chair.

In opening the proceedings, Lord LOVAT said that it was with regret he had to meet them here in such dreadful weather. The meeting had been called according to rule to hear any motion of which notice had been given. Mr Menzies informed him, however, that no notice of motion had been given, so that the business would be very short, and merely of a formal character.

Lord LOVAT then moved the following resolution :—"That the Highland and Agricultural Society of Scotland deem it their duty to record the deep and sincere regret with which they have received the intimation of the death of Mr Whyte-Melville of Bennochy, convener of Fifeshire, who at the time of his decease, was father of the Society, having been elected a member in 1819 ; and their sense of the services rendered by him as a member and as a Director."

The motion was unanimously adopted.

Sir JAMES GIBSON-CRAIG, Bart., moved—"That the thanks of the Society are eminently due to the Right Hon. Lord Lovat, convener of the Local Committee elected by the counties embraced in the district of the Inverness Show, for his personal exertions in promoting the interests of the Show ; and to the individual members of that Committee for the co-operation in carrying into effect the wishes of the Society, and the purposes of the meeting." Wherever, he said, we go into Scotland, we always meet with a pleasant reception, and we never got a better chairman than we have in Lord Lovat. His Lordship is well known all over Scotland, and especially in this district, for the interest he takes in all the matters which this Society was formed to promote, and the way in which he personally shows attention to the rearing of fat stock in this country is of great importance to the district with which he is connected. I am sure that on the part of this Society, I can say how deeply indebted we are to the Local Committee for carrying out the Show, for the hearty welcome we have received in Inverness, and for the manner in which, despite the weather, we have been enabled to enjoy ourselves.

The Rev. Mr GILLESPIE, Mouswald, seconded. The motion was agreed to unanimously.

Lord LOVAT acknowledged the compliment in his own name and in the name of the Local Committee.

Colonel GILLON of Wallhouse moved—"That the thanks of the Society be given to the Commissioners of Supply for the counties of Inverness, Elgin, Nairn, Ross, Caithness, and Sutherland, for the liberality with which the auxiliary funds were provided by them."

Mr MYLNE, Niddrie Mains, seconded. So long, he observed, as the Commissioners were liberal, and so long as the people of the north were anxious for the Show to be held at Inverness, the Society would continue to pay them a visit regularly, and see this magnificent country.

Mr SCOTT-DUDGEON, moved—"That the thanks of the Society be given to the Inverness Farmers' Club, the Northern Counties Pastoral Club, and the Easter Ross Farmers' Club for their contributions towards the Inverness Show."

Mr MACQUEEN of Crofts seconded the motion, which was adopted.

General BURROUGHS moved—"That the thanks of the Society be given to the Provost and Magistrates of Inverness for their co-operation in carrying out the arrangements connected with the Show, and for their contribution to the funds of the Society."

Mr HENDERSON of Stemster seconded the motion, which was agreed to.

Lord LOVAT moved—"That the thanks of the Society are due to Colonel Gillon of Wallhouse for the zeal with which he discharges the duty of chairman of the Standing Committee on General Shows."

The MACKINTOSH of Mackintosh seconded the motion, amid applause.

Colonel GILLON—I thank you most sincerely for having accorded a vote of thanks to me. I have been a long time connected with the Society, but my duties have been very light indeed. I am delighted to serve the Society wherever it meets, and I am more pleased when I come to the north than when I go anywhere else ; for this Society was instituted not to become a central affair at all, but to visit periodically the far northern districts. And we shall continue to visit this district, and never miss a turn. We never, I hope, shall miss a turn. It is nine years since we last visited Inverness, and if I may be allowed to say something complimentary of it, I must say that I see on this occasion very many improvements, and distinct signs of advancement. We have met very many old friends, and, notwithstanding the weather, we have been exceedingly happy and delighted on this visit to Inverness.

The resolutions were formerly put and agreed to.

An opportunity was given for suggestions, but none were given, and on the motion of Lord ARTHUR CECIL, a vote of thanks was accorded to the Chairman, which concluded the proceedings of the meeting.

CENTENARY GENERAL MEETING, 16th JANUARY 1884.

Mr Scott Dudgeon, Longnewton, and afterwards Mr Balfour of Balbirnie in the chair.

New Members.—107 noblemen and gentlemen were duly elected members, after the usual ballot.

Office-Bearers.—The following noblemen and gentlemen were elected to fill the vacancies in the list of office-bearers for 1884:—*Vice-Presidents.*—The Marquis of Lothian, K.T.; the Earl of Haddington, the Earl of Wemyss and March, the Earl of Hopetoun. *Ordinary Directors.*—James T. S. Elliot, yr. of Wolfelee; John Marr, Cairnbrogie; Niven Matthews, Whitehills; Jonathan Middleton, Clay of Allan; James Murray, Catter House; Robert Paterson of Birthwood; R. G. Wardlaw Ramsay of Whitehill; Harry Young of Cleish Castle. *Extraordinary Directors.*—Lord Elcho, M.P.; the Lord Provost of Edinburgh, Sir Alexander Kinloch, Bart.; Sir Hew Dalrymple, Bart.; Sir James R. Gibson Maitland, Bart.; Sir William Baillie, Bart.; Sir James H. Gibson-Craig, Bart.; Robert Dundas of Arniston; Colonel Learmonth of Dean; Peter M'Lagan of Pumpherston, M.P.; James Hope, East Barns; John Scott Dudgeon, Longnewton.

Mr Richmond, Hilton, asked why the name of Mr Gardiner, who had been elected by a majority at a meeting held at Perth to represent the Midland Counties, did not appear in the list?

The Chairman replied that the Directors, after considering the matter, did not think it expedient to give any reasons for their choice of Directors—for there being any one put forward—but that in regard to Mr Gardiner he now held in his hand a letter from that gentleman withdrawing his nomination. That, he thought, was quite sufficient for the meeting.

At this stage Mr Scott Dudgeon vacated the chair in favour of Mr Balfour of Balbirnie, who was now the senior Director present.

The Annual Accounts—Mr Mackenzie of Portmore, in the absence of Mr Murray of Dollerie, laid on the table the annual accounts of the Society, which were approved. The accounts of the Argyll Naval Fund were also submitted.

Inverness Show, 1883.—Colonel Gillon of Wallhouse said the first duty devolving upon him as chairman of the Committee on General Shows was to report on the late meeting at Inverness, but the proceedings had been so fully and widely circulated by means of the daily and agricultural press that it seemed almost unnecessary to do more than refer to one or two points. When he had the honour of reporting to the last general meeting, the propriety of holding the Show was discussed. The Directors afterwards, in consideration of the regulations by the local authorities of the county and burgh of Inverness, and the wishes of the exhibitors, resolved that the meeting should go on, and it was a source of much gratification to add that no evil resulted from the Show being held. The site chosen for the yard did not belie the ardent representations made of its suitability for the purpose, and it is believed that a more desirable or convenient place could not have been found in the neighbourhood. As regards the weather, the judging on Tuesday had to take place during much rain, while Wednesday was showery throughout; on Thursday the weather showed an improvement, and kept fine on Friday, when the yard was crowded with visitors. In a financial point of view there had not been such a serious difference between the receipts and expenditure as occurred on the previous Show at Inverness. The receipts in 1874 were £3393, while the general expenses and premiums amounted to £4794, making a loss of £1401. Last year the receipts were £4081, and the expenses and premiums came to £4920, showing a deficit of £838. The Society, he need scarcely add, met with that support and reception which have always been accorded to it in the capital of the Highlands. Special votes of thanks were given at the general meeting of members held in the showyard to Lord Lovat, on whose zealous and efficient services, in the absence of the Duke of Richmond and Gordon, so much of the success of the Show depended; to the Commissioners of Supply for the counties embraced in the district, and to the Provost and Magistrates of Inverness, for their contributions in aid of the Show.

The report was adopted.

Edinburgh Show, 1884.—Colonel Gillon then said the General Show this year would take place at Edinburgh, on the 22nd, 23rd, 24th, and 25th of July, on a park at the Dean. This would be the Society's fifty-seventh exhibition, and the eleventh which has been held in the metropolis of Scotland. In addition to the usual premiums, the Society on this occasion offers—(1) Three family prizes in each of the breeds of cattle, viz., a cow and three or more of her descendants (male or female) in the female line (oxen excluded), bred by or *bona fide* the property of the exhibitor; and (2) three family prizes in the class of horses for agricultural purposes, viz., for five animals foaled in 1882 (male or female, the offspring of one sire), not necessarily the property of one person; and three prizes for five animals foaled in 1883. In consequence of the liberal manner in which the Ayrshire Cattle Herd Book Society, the Polled Cattle Society, the Galloway Cattle Society, the Clydesdale Horse Society, and the breeders of stock generally have come forward with auxiliary

funds, the list of premiums will also contain additional prizes in all the breeds of cattle; in the classes of Clydesdale and of hunting horses; in the Blackfaced, Cheviot, and Border Leicester breeds; and also, it is expected, in the classes of Shropshires and Half-bred sheep. Although it has not been the practice for some time to offer premiums for dairy produce at the Shows held in Edinburgh, the Directors, on such an occasion as the Show of this year, anxious that nothing should be omitted from the list bearing on agriculture, have repeated the premiums for butter and cheese which were offered at Glasgow in 1882. Another interesting feature of the Show will be a working dairy, which will be open for the inspection of the implements used in the separation of butter and cream, and in the manufacture of different kinds of cheese. In the implement department premiums will be offered for exhaust fans, broadcast manure distributors, seed cleaning machines, cream and milk separators, machinery for making butter, and travelling steam-engines. As to the regulations, I need only refer to two, which, I venture to think, will meet with general acceptance, viz., (1) that all former prize animals are eligible to compete; and (2) that the animals for the family and special prizes may, with one exception, be drafted from the regular classes. Tickets will be sent to all members residing in the United Kingdom whose addresses are known, and on no account will duplicates be issued. Mr Dundas of Arniston has been named by the Directors convener of the Local Committee, and he has agreed to act. No time will be lost in finally adjusting and publishing the list of premiums, to enable intending exhibitors to make the requisite arrangements. In accordance with the wishes of members in the district connected with the Show, it has been resolved to vote £100, to be equally divided between the counties of Edinburgh, Haddington, and Linlithgow, for entire horses to travel this season in the Lothians.

This report was unanimously approved.

Aberdeen Show, 1885.—Colonel Gillon further reported that, according to the usual rotation, the Show of the Society for 1885 would be held at Aberdeen, and he submitted a list of the proposed classes of stock and implements, as prepared by the General Show Committee and Directors. In regard to the list, it might suffice to say that in addition to all the usual classes of breeding stock, the Tweeddale Gold Medal would be given for the best shorthorn bull in the yard, while in the native breed of the district (polled Angus or Aberdeen) a section was added for three-year-old cows, as well as a family prize for a cow and three or more of her descendants (male or female) in the female line (oxen excluded), bred by or the *bona fide* property of the exhibitor. Special premiums would be offered for implements for the autumn cultivation of stubbles, and for the spring cultivation of land intended for a green crop. Premiums would also be given for cured fish and fish products, and medals for bee husbandry.

This report also was approved.

Chemical Department.

Dr Aitken, chemist to the Society, then gave in his report as follows:—I have to report regarding the experimental stations, that the barley crop of 1883 was secured in good order at both stations. A public demonstration took place at Pumpherston on the 31st of August. Besides the general scheme of experiments which has been in progress from the beginning, the most of the plots were divided into two equal parts, to show the different effects of early and late application of nitrate of soda. To one half of each plot the nitrate was applied at the time of sowing along with the other manures. It was intended to apply the nitrate to the other half about three weeks thereafter, but by that time, owing to the extreme dryness of the weather in May, many of the plots had not brairded, and it was not till fully a fortnight later that the braird seemed far enough advanced to receive the second application of nitrate. It was applied on the 16th June, and a tack of wet weather succeeded, which forced the crop away at a rapid rate. The division which received the late application of nitrate was in a very backward state at first, but it rapidly overtook the earlier sown division and showed a taller greener crop. The storms of wind and rain which occurred on the 9th and 13th August did much injury to the crop, but especially to that part which had received the late dressing of nitrate. At the time of the inspection the full effect of the stormy weather was very apparent. Large breadths were levelled to the ground or twisted about in great confusion, while a vigorous aftergrowth was forcing its way through the fallen corn. But for the stormy weather it is probable that the part where the nitrate was sown late would have produced a much heavier crop than the other, but in order to secure that result, calm and warm weather would have been needed during the season of ripening. Where the nitrate was applied early the straw was neither so long nor so abundant, but it was much stronger, and received less damage during the stormy weather. The situation of Pumpherston is high and exposed, and it is evident that in such circumstances a late application of nitrate of soda is attended with considerable risk. Had the season been a normal one, and the nitrate

applied not later than three weeks after the time of sowing, it seemed evident that much advantage would have resulted from that method of manuring, and next year, when the station is under oats, the experiment will again be tried, when it is to be hoped the conditions will be more favourable. The results of the barley crop will be given in the *Transactions*, along with the analysis of the previous turnip crop, which is just approaching completion.

During the past year ten local analytical associations have sent in returns of their analyses for the purpose of obtaining the Society's grant, and its aid in furtherance of the objects they have in view. Twelve associations applied for the grant last year and thirteen the year before. There is thus a slight falling off in the number of associations who take advantage of the Society's co-operation. There is no doubt that the cause of this diminution is the difficulty which some associations have experienced in strictly adhering to the Society's regulations. Last year's experience made it evident that unless these regulations were thoroughly carried out very little good could be done by the Society's scheme, and the secretaries of the associations were informed that the regulations would thereafter be strictly enforced. Strict adherence to the Society's regulations requires increased care on the part of every member of an association who is having analyses made for him, and also entails considerable trouble on the secretary, and it is gratifying to find that so many have been able to conform to the regulations this time. In the case of associations in whose administration some looseness prevails, there may be some difficulty in complying with all the details of the Society's scheme, and they may prefer to lose the grant rather than be at the trouble of observing the rules required for obtaining it. I hope that if there are any associations so minded, they will reconsider their position, and come to see that the method of procedure required by the Society is founded on fairness, and is not more troublesome than is necessary to secure the objects for which such associations exist. There is no doubt that considerable injustice and misrepresentation have occurred in the past from the defective way in which the work of associations has been carried on, and it is to the interest of sellers as well as buyers to see that the Society's regulations affecting analytical associations are faithfully carried out.

The Society's scheme has now been in operation for three years, and from the statistics now before us we are able to see how far it has been successful. The object the Society has in view in co-operating with analytical associations is not only to lessen the expense of analysis by the bestowal of a grant, but to guide the farmer to a proper appreciation of the true value of manures, to protect him as far as he will be protected against the misfortune of purchasing inferior and sham materials, to drive fraudulent dealers out of the market, and to protect the interests of merchants who are supplying the wants of the farmer in a fair and honest way. That the Society's liberality has not been taken advantage of to anything like the full extent was perhaps inevitable ; but there is abundant evidence that those who have listened to the advice and accepted the direction of the chemical department have derived much benefit from the fact. At the general meeting in January, two years ago, while criticising the returns made by the associations, it was pointed out that nearly one-third of the manures supplied were under their guarantees, and that many were deficient to an alarming extent. Many manures were sold without a sufficient guarantee, and also under names which were misleading, as they did not represent their true character, and chief among these were dissolved bones and special manures. Regarding the latter, farmers were warned of the risks they ran in ascribing special value to manures sold under special names, often at very high prices. A comparison of the number of manures of various kinds bought by the associations during the last three years shows that farmers have profited by the advice.

		1881.	1882.	1883
Standard Manures.	Bones	33	45	22
	Dissolved bones	65	59	37
	Superphosphate	30	32	26
	Peruvian guano	14	11	6
	Ichaboe guano	2	1	0
	Dissolved guano	5	2	2
	Fish Manures	3	3	4
	Ground phosphates	2	2	1
Special.	Turnip manures	14	6	10
	Potato manures	10	3	2
	Miscellaneous	9	13	3
	Nitrate of Soda	1	4	6
	Potash salts	7	6	7
	Linseed cake	19	10	20
	Other cakes	7	5	4
		221	202	150

There is a great decrease in the total number of samples analysed, due, no doubt, to the more limited use of artificial manures during the recent dull times. Dissolved bones still remain the chief manure, but superphosphate shows least diminution. The numbers of special manures during these three years have been respectively 33, 22, and 15, and the last number contains some mixtures which were made according to the directions of the buyers. In 1881 these manures were sold at prices averaging 29s. above their value, in 1882 the prices averaged 25s. above value, and in 1883 the average excess of price over value was only 9s., showing that not only are farmers avoiding special manures, but they are obtaining the few they require at prices not so inflated as in former years. If we compare the quality of the manures during these years, the improvement noticed is even more striking. Taking the three most important manures the number and percentage which fell below their guarantees, were as follow :—

	1881. No.	1882. No.	1883. No.	1881. per cent.	1882. per cent.	1883. per cent.
Bones	12	9	4	36	20	18
Dissolved bones ...	13	12	6	20	20	16
Superphosphate ...	6	5	2	20	15	8
Total ...	31	26	12			

Generally speaking, we may say that the proportion of deficient manures has been halved during the last three years.

Not only has the quality improved, but instances of overcharge are far less frequent. By overcharge is meant the excess of the price of the manure over what is found to be its value, as determined by units of valuation. The amount of overcharge will depend upon the nature of the units, and these fluctuate with the market. I find that when due allowance is made for variations in market prices from year to year, the number of samples which were bought at prices clearly in excess of their fair value during the last three years were as follow :—

	1881. No.	1882. No.	1883. No.	1881. per cent.	1882. per cent.	1883. per cent.
Bones	14	5	2	42	11	9
Dissolved bones ...	12	15	6	19	25	16
Superphosphate ...	8	4	1	27	13	4
Total ...	34	24	9			

There is not one-third of the overcharging that was found three years ago, and instances of gross overcharge are now reduced to a very low number.

I think the Society is to be congratulated on these results, for although there may have been other causes operating to produce them, there can be no doubt that this great improvement is mostly due to the various means which the Society has employed through its chemical department to give farmers a better knowledge of the nature and value of manures, and the best method of purchasing them. This year there are again some cases of deficiency where the discrepancy between the guarantees and the stuff supplied are so considerable as to require publication ; but their number over the whole of the associations is not so great as was found in the case of only one association last year.

The units for the valuation of manures for the current year will shortly be published. The system of valuation devised for last year has been found to work very well, and the returns made by the associations have shown the extreme accuracy of the units which were fixed last January. The average price of bones last year was £8, 7s., and their average value by the Society's units, £8, 8s.; the average price of dissolved bones was £6, 16s., and the average value by the Society's units £6, 13s., ; the average price of superphosphate was £4, 4s., and the average value by the Society's units £4, 5s. The adjustment of the units will again be made with the same careful consideration as last year, and if any members of the Society have any suggestion to make for the improvement of the system of manure valuation, the Chemical Committee will be glad to receive them, and now is the time to make them.

Mr Lindsay, Meadowflat, said he was sure they had listened with great pleasure to

this report, and that the Society should be congratulated on having a chemist who took such an interest in his work. They had learned much in the past, and he hoped they would learn much in the future. There was one question which he wished to ask. Their expenditure was kept on year by year, and they were credited with nothing for the crops in the past. A sum of £20 was allowed, but this was got up by subscriptions. It was, perhaps, too early to realise the last crop, which was barley; but he thought the crop of turnips for 1882 should have been put into the market. He would be glad to hear from Dr Aitken what he had done with the turnip crop for 1882.

Dr AITKEN replied that he believed there was a considerable amount of arrears at one of the stations which was at present being looked into, and he had no doubt that it would soon be put in order. The receipts from Harelaw Station had been regularly transmitted, but the money received for the turnip crop of 1882 had been received a few days too late to be included in last year's accounts.

The report was then adopted.

ENSILAGE.—Mr MACKENZIE of Portmore gave in the following report:—"I have the honour to report that in accordance with the arrangement made at this time last year a silo of about 100 tons capacity was duly made during the spring at the farm of Harcus, and filled during the summer. In order to make the experiment more complete, another silo of about 100 tons capacity was made at Earlypier Farm and filled. These silos were formally opened on the 20th December last, when the contents of both were found to be well preserved, and to be palatable to cattle. As the public press reported very fully upon them at the time they were opened, I do not propose to occupy your time with any detailed description of them or their contents; but I think it will be interesting to the Society to know that the ensilage shows no signs of deterioration as we approach the centre of the mass, but rather improves. The cattle continue to eat it heartily, and it appears to agree with them well in every way. The committee therefore think they are justified in reporting that the experiment has proved successful up to this point, and, along with other experiments in Scotland, England, and Ireland, goes to show that green fodders can be efficiently preserved in silos for use in winter and spring in these countries as well as in those where the system has been longer in use. But the proof of the fact that fodders can be thus preserved is only the first step. Before it can be expected that the system should become general it is necessary to show the value of this preserved fodder as compared with other foods in present use, and the attention of the Committee on Ensilage is now directed to this end. It has been arranged to experiment this spring upon twelve cross polled stirks; the half of these are being fed upon a certain quantity of ensilage, and the other half upon a certain quantity of turnips and oat straw, while each lot gets an equal amount of cake. The cattle were weighed one by one at the commencement of the experiment, will be weighed once or more during its continuance, and again at its conclusion, when they are turned out to grass. In this manner ensilage will be tested in comparison with turnips and oat straw by a calculation of the money value of the food consumed by each lot of cattle, and of their increase in live weight. It has also been arranged that in the event of a scarcity of grass at lambing time an experiment shall be made with two flocks of ewes in parks to test the value of ensilage against turnips and hay for the production of a flow of milk. These are the only experiments which the committee find themselves able to undertake this spring, and the results will be reported to the Society in due course. Dr Aitken proposes to take samples of the different kinds of preserved fodder from both silos during the current week for the purpose of analysis, and the committee feel sure that the Society will look with much interest for the result of his investigation." After reading the report, Mr Mackenzie said that with the assistance of Dr Aitken and Mr Mylne, and other members of the committee, the subject would not be allowed to flag, and that the most practical and reliable results would be brought out.

The CHAIRMAN said he thought every member of the Society, and indeed the whole of Scotland, must feel very grateful indeed, not only to the committee, but principally to the convener, for the practical manner in which this question of ensilage was being carried out, and in regard to what was proposed to be done as to making it practically useful, and showing how the ensilage could be best applied. He thought they would all agree with him that it was right that they should give a special vote of thanks to Mr Mackenzie of Portmore for the way in which he had enabled the ensilage to be thoroughly tested and carried out in operation.

Mr MACKENZIE, in thanking the meeting for this unusual compliment, said that he believed this system of ensilage was to be one which would very largely benefit every section of agriculture in this country. It had given him the very greatest pleasure to be able to do something in furtherance of the demonstration of it. He had been materially aided in this matter by the committee that the Society were good enough to appoint along with him to look after it, and further by the admirable exertions of his land steward, Mr Brydone, to whom, he believed, the whole of the success of this experiment was due.

POTATO CULTURE.—Mr MYLNE, Niddrie Mains, reported on the subject of potato culture. He stated that at the general meeting in January last it was remitted to the Directors to encourage the raising and introducing new varieties of potatoes by the giving of premiums or otherwise. In accordance with this remit, the Directors, at their meeting in February, appointed a special committee to consider the best means of carrying the resolution into effect. On the recommendation of this committee, the Directors resolved at their meeting in April to offer the sum of £50 as a prize or prizes for best variety of disease-resisting potatoes which had never been sold or offered for sale, such variety to be a seedling of not less than five years' growth. By the conditions, not less than one stone of such variety was to be entrusted to the care of the Society, under whose superintendence they were to be tested as to their disease-resisting properties for one year, at the expiration of which time the prizes were to be awarded; the produce of the potatoes to belong to the owners, and no prize to be awarded to any variety showing any symptom of disease. In terms of these conditions, five competitors lodged samples, which were all planted on the 1st day of May, on ground on the farm of East Barns, Dunbar, kindly granted for the purpose by Mr James Hope. The competitors were resident in the counties of Aberdeen, Ross, Lanark, Kincardine, and Fife—one from each county. The crops were inspected by a sub-committee on 7th August, and were reported on as follows:—No. 1 (Aberdeenshire) appeared an early reddish potato, good size at this date, and apparently a distinct variety. No. 2 (Ross-shire) had sufficient growth, not early, and appeared genuine. No. 3 (Lanarkshire), white blossoms, but a slight mixture of purple blooms, scarcely so growthy; not early. No. 4 (Kincardineshire), a strong variety, very like the Champion; shaw of great growth, evidently a very late variety. No. 5 (Fifeshire), a very genuine variety, but with less top than the other varieties. A second inspection took place on the 23rd of October, when the sub-committee reported in the following terms:—No. 1. White potato, red streaks, good size, free from disease, and a fair crop. No. 2. A white variety, resembles the Victoria in shape; is diseased, and appears a strong growing variety, and a fair crop. No. 3. A white variety, also resembling the Victoria; a poor crop, and some disease. No. 4. A white round variety, something like the Champion; it is diseased, and is a poor crop, though somewhat better than Nos. 3 and 5. No. 5. A white variety, in shape like No. 3; it is a poor crop, and very much diseased. The sample (No. 1) which appeared to be free from disease when inspected on 7th August and 23rd October was, on lifting it on the 3rd of November, found to be diseased. The length of drill planted of this sample was 60 yards, and the weight of the whole crop was 15 st. 11 lbs., of which 12 lbs. are diseased. No. 2. Lifted same date (3rd November). Length of drill planted, 77 yards. Total weight of crop, 21 st. 12 lbs., of which 14 lbs. were diseased. No. 3. Lifted same date. Length of drill planted, 59 yards. Total weight of crop, 12 st. 7 lbs., of which there were 10 lbs. diseased. No. 4. Lifted same date. Length of drill planted, 212 yards. Total weight of crop, 63 st. 2 lbs., of which 5 st. 3 lbs. were diseased. No. 5. Lifted same date. Length of drill planted, 61 yards. Total weight of crop, 13 st. 5 lbs., of which 1 st. 5 lbs. were diseased. From these statistics it would be observed that No. 2 sample was the best crop, and contained the smallest proportion of diseased tubers; and out of all the samples, it appeared the variety that most resembled a good field potato. Mr Mylne concluded by stating that there would thus be no prize awarded.

AGRICULTURAL BURSARIES.—Mr VILLIERS, Closeburn Hall, reported that the examination for the Society's bursaries took place on the 17th of October, when eleven candidates enrolled their names, and the following passed:—For bursaries of £20 each—Alexander Edward, Dundee, and Alexander Johnstone, Edinburgh. For bursaries of £10 each—Andrew R. Dunnet, Auchingill, Caithness; Henry C. Fergusson, Stanley, Perth; J. G. Nicolson, Wick; and John Wilson, St Andrews.

DISTRICT SHOWS.—Colonel HARE of Calder Hall reported the premiums awarded in 1883 and those offered in 1884.

COTTAGE COMPETITIONS.—Mr MACKENZIE of Portmore reported the premiums awarded in 1883 and those offered in 1884.

ESSAYS AND REPORTS, 1883-84.—Mr IRVINE of Drum reported the premiums awarded for reports in 1883 and those offered in 1884.

Mr MAXWELL of Munches suggested that the Directors should take into consideration whether they should not give up the forestry part of the awards. There was now a forestry society in Scotland which was considering that matter, and the Highland Society might, without much injury to its exertions, drop these awards.

Mr IRVINE said that no doubt the Directors would consider this matter, but he might mention that the awards for forestry were not very numerous this year.

The report was then adopted.

DISEASED CATTLE IMPORTATION.—Mr SCOTT DUDGEON, Longnewton, reported that at the meeting of the Board on the 5th of December, the following resolution had been adopted:—"The continued prevalence of foot-and-mouth disease, and the large increase in the number of outbreaks throughout the United Kingdom, since the Highland and

Agricultural Society's deputation waited upon the President of the Council in the end of April, compel the Directors of the Society again to urge upon the Government the necessity of no longer delaying to give effect to the recommendation of the Royal Commission on Agriculture, 'that the landing of foreign animals should not be permitted in future from any countries as to which the Privy Council are not satisfied that they are perfectly free from contagious disease.' The past experience of the working of the Contagious Diseases (Animals) Act, 1878, as administered by the Privy Council and local authorities, has proved it to be a complete failure in preventing the introduction of disease from abroad, and the constant recurrence of alarming and widespread outbreaks of foot-and-mouth disease throughout the kingdom ; while, from the want of uniformity in the restrictions enforced by the various local authorities and the necessity which exists for their almost constant imposition, these restrictions have become intolerable to the breeders and feeders of live stock, and are interfering most prejudicially in the adequate supply of butcher meat and dairy produce to the British public."

To this representation the following reply was received :—

"Agricultural Department, Privy Council Office, 44 Parliament Street,
"Westminster, S.W., 12th December 1883.

"Sir,—I have submitted to the Lords of the Council the resolution passed by your Society on the 5th inst., transmitted in your letter of the 6th inst.

"With reference to that part of the resolution which desires the Privy Council to give effect to the recommendation of the Royal Commission on Agriculture, 'that the landing of foreign animals should not be permitted in future from any countries as to which the Privy Council are not satisfied that they are perfectly free from contagious disease,' the Privy Council are advised that such a measure, by substituting prohibition for slaughter at the port of landing, which is prescribed by the Contagious Diseases (Animals) Act, 1878, would be one of a legislative and not an administrative character. I am also to point out that if the Privy Council had been able to act, and had acted on the recommendation of the Royal Commission, the unfortunate prevalence of foot-and-mouth disease throughout the autumn in so many parts of the country would have remained entirely unaffected. Of this fact no reasonable doubt can be entertained when it is considered that from the 1st of July last to the present date only three cases have occurred in which animals affected with foot-and-mouth disease have been landed in Great Britain, and in none of these cases is there any ground for suspecting that the infection was not absolutely confined within the foreign animals' wharf.—I am, &c., (Signed) "C. L. Peel.

"The Secretary, Highland and Agricultural Society of Scotland."

This reply was laid before the Board on the 9th of January, when the following resolution was adopted :—"That the Directors have received with great disappointment the above answer of the Lord President of the Council, as they feel strongly the absolute necessity of prohibiting the importation of live animals from all countries as to which the Privy Council are not satisfied that they are free from disease. From the above answer it appears that diseased consignments of animals have been received into this country on three separate occasions since the 1st of July last, which the Board consider sufficiently dangerous to make their request only reasonable."

After reading the report, Mr Scott Dudgeon expressed regret on his own part, and the regret and disappointment of the members of the Society and farmers generally, that the representations which had been made by the Highland and Agricultural Society and other societies that the strong feeling which had been expressed with such unanimity throughout the country by the agricultural interests had hitherto been ineffectual in moving the Government in the matter. There was no question that he could remember of on which agriculturists of every political opinion were more unanimous than this of cattle disease, and it was a strong evidence of the want of power of the agricultural community in bringing anything affecting their industry to bear upon the Government of the country. The matter of cattle disease was one which affected their industry to an enormous extent, and every one acquainted with the workings of the Contagious Diseases (Animals) Act would know that the restrictions which had been in force throughout the country had been a great source of loss—not only of annoyance but of direct loss, and still more of indirect loss—to the agricultural community. And he was sure no other industry in the country, even much less important than that of agriculture, would have submitted to the annoyance and loss as the farmers had done, and exhibited the patience they had exhibited. And he was glad to say that there was evidence now throughout the country that the farmers were feeling that this sort of thing would not do. He noticed during the recent weeks and months of autumn that meetings had been held very generally throughout the south, especially in England, and a very strong expression of opinion had been given at these meetings. That he took as an evidence that the farmers would not submit to have their interests ignored any longer as they had been in the past. All the experience of the workings of the Cattle Diseases Act had gone to show—it was now an admitted

fact by every one—that foot-and-mouth disease had not a spontaneous origin, and was not indigenous to the country, that if they were once free from it—and they were once free from it in 1880—if they had not got it again from abroad they would have been still free from it, and it was only, he thought, a reasonable request, and one which they should not cease to press till they got it carried, that they would not have the importation of disease into this country—at least that they would have every means taken to prevent the importation of disease into this country. This was not a cry for protection against free trade. They did not want protection against animals or butcher meat at all—it was protection against disease only that they wanted—and they would welcome animals guaranteed free from disease from any country; in fact, they would be glad to get them. It seemed impossible that the disease could be stopped till more speedy measures were taken to prevent animals suffering from it coming to our shores.

Mr Melvin, Bonnington, said that in the correspondence Mr Peel, writing for the Privy Council, threw out a suggestion which might be acted on with advantage, when he stated that the present measure was not sufficient to carry out the request of this Society in regard to the Royal Commission. If that was the case, would it not do for this Society to recommend or ask that a commission be appointed to take the whole subject of cattle diseases into consideration, so that disease might be kept out of the country, and only healthy animals admitted? It was wretched to think that they were dependent entirely on Ireland for their supply of cattle. If that commission were appointed, there were a number of questions that would come up for its consideration. At present there was a multitude of local authorities throughout the country, every one with its own doctrines and opinions as to what should be done, and that created confusion. Indeed, for some time past the cure had been worse than the disease. It seemed to him that the Society had good opportunity to take advantage of that statement by Mr Peel. The appointment of a commission might shut the mouths of those who said this was a mere question of protection, and that there was a desire to exclude all sorts of cattle from the country, which he always held it was not.

Mr Bethune of Blebo said he did not know any subject equal in importance to this. They must get at the root of the evil, or else it would ruin the agriculture of the country. The subject divided itself into two heads. The agriculturists of the country must compel the Government of the day not to pour in disease upon them. It was said the cure was worse than the disease. They must bring it broadly before the country that there were a number of men who did not go the length of saying that. He was constantly persecuted by people saying the restrictions were worse than the disease. They wanted to exercise some common sense. If the Privy Council could not get hold of it, the Society would send them one man, and English societies, of six of which he was a member, would do the same. The diseased cattle were being poured in upon them. They must get at the truth, or perhaps they would be all dead, and their cattle too, before the thing was stopped. They must stop the pouring in of those cattle at the bar of the House of Commons. Agriculturists were not to be humbugged by any Government, whether Whig, Tory, or Radical. They would not submit to have the disease poured in upon them. He for one was treated in the most ferocious manner. They had enough of troubles without this foot-and-mouth disease. They must have one universal code. They must teach the Privy Council on the subject, and he did not know any persons more likely than the tough Scotch farmers to do that. They must have a short code of universal practice. If ever there was madness in the world it was the present course of action. He knew the disease had brought numbers to bankruptcy, and had ruined many. The code must be made universal to stop the disease, and agriculturists would turn out half a dozen Governments—Whig, Tory, or Radical—unless they did what was wanted.

The Chairman, referring to the remarks as to the division of opinion among local authorities, observed that there was now a central board which was doing a good work under Mr Stirling of Kippendavie. There was a desire to have an attempt to get the local authorities to work in unison, and he thought that was a step in advance.

Mr Scott Dudgeon read the following letter from Major Craigie, the secretary of the Central Chamber of Agriculture, to Mr F. N. Menzies.

"Cattle Diseases Committee, Central Chamber of Agriculture, 7 Arundel Street,
"Strand, London, W.C., 26th December 1883.

"Dear Sir,—In view of the necessity of moving the Government to further action in the direction of excluding animals from countries infected with foot-and-mouth disease, power has been given to this committee to ask the co-operation of other societies, and to establish a special fund for the purpose of circulating information by printed papers, or by lectures, especially in the towns. The suggestion has been promptly responded to, and various leading members of the Council of the Royal Agricultural Society have added their names to the committee for this purpose. I enclose a list of the committee appended to the report herewith, and also a copy of a reprint which the committee has had made of a recent paper by Mr Duckham, M.P. for Herefordshire. By parcel post

I have sent you further copies, and if you can help the committee in devising methods of diffusing information as to the true state of the case as regards the importation of foot-and-mouth disease I should be grateful. Possibly some of your Directors might be willing to join in this effort, and allow their names to be added to the committee, and perhaps subscribe to the special fund.—Yours faithfully,

(Signed) "R. CRAIGIE."

After reading the above letter Mr SCOTT DUDGEON went on to say that they must try as far as they could to educate the consuming public on this question. They were influenced very much just now, and their minds were poisoned very much by a few men interested in the foreign cattle trade; and the members of this Society must try to get them to understand the matter. The association referred to was originated for that purpose, and this was the first of their publications that had been issued.

Mr PATERSON of Birthwood said that the Glasgow men were treating them differently from what had been expected. By the proposed unity of action it seemed to him they were to pay nothing, and the counties were to pay all. That was their unity. Lanark had given intimation that it was to go out of the union at all events.

The report was then approved.

LOUPING-ILL AND BRAXY.—Mr ELIOTT LOCKHART of Borthwickbrae gave in the report of the committee.

The proceedings then terminated.

ENSILAGE EXPERIMENTS AT PORTMORE.

Experiments in ensilage have this year been carried out on an extensive scale on Mr Colin J. Mackenzie's estate of Portmore, Peeblesshire, and being the most important hitherto conducted in Scotland, farmers generally have been looking forward with great interest to the result. The new system of preserving fodder, which has been very successful in America, has caused considerable speculation among British agriculturists as to its adaptation to the climate and conditions of this country, and on the matter being brought before the Highland and Agricultural Society, a committee was appointed to inquire into it. Mr Mackenzie of Portmore, during recent visits to America, was favourably impressed with ensilage as a nutritious food for stock, which might overcome many drawbacks during an unpropitious season, and he agreed to undertake the experiments on behalf of the Society. Two silos were erected last summer at different steadings on his estate, and yesterday they were opened in the presence of between 200 and 300 agriculturists, many having come a great distance. Among those present were—Mr F. N. Menzies, Secretary to the Highland and Agricultural Society; Dr Aitken, Chemist to the Society; Lord Lionel Cecil, Orchard Mains.

The silo at Earlypier farm-steading was the first visited, and, under the supervision of Mr Mackenzie, it was opened.

The silo was excavated early in June; building commenced June 11, and ended July 14. Construction of wall and floor same as at Harcus, but the dimensions of the silo differ somewhat, as this one is 24·3 feet long by 12 feet wide and 15·6 feet deep. This, at 45 cubic feet per ton, gives a capacity of 100 tons and a very small fraction. In the case of this silo the end wall is wholly exposed, and the door is on the level of the floor. The cost has been—Excavation, £4, 5s.; building, including cement, £55, 14s. 7d.; roofing and joiners' wages helping with framing, £12, 10s.; cartage, £3, 5s.; total, £75, 14s. 7d.

This gives a fraction over 15s. per ton of capacity. The cost of boxes for weights, and planking to cover the ensilage and to fill the spaces between the pillars, has been £11, 10s. By adding this to the former sum of £75, 14s. 7d., we have a total of £87, 4s. 7d., equal to nearly 17s. 6d. per ton. The silo was filled on August 8, 9, and 10, with 42 tons of a heavy crop of clover and rye grass, nearly all of it being put in during heavy rain, and the stuff being quite saturated. It subsided nearly 7 feet, and on the 25th August it was filled up with 28 tons of grass cut off a lea field, which had been manured for the purpose in the spring. The weight in this case, as at Harcus, has been about 150 lbs. per superficial foot. No test for heat was carried out here. The odour which came from the door was less pungent than at Harcus. The cost of cutting, hauling, tramping, putting on the weights, removing them for refilling, and again putting them on, has been £19, 6s., equal to 5s. 6d. per ton stored. Here, as at Harcus, the expense was considerably enhanced owing to the great amount of tramping performed; and, in regard to both silos, it should be remembered that all hands were new to the work.

The silo was opened (20th December 1883) from the top, at the end in which the door is pierced. Several layers of the meadow grass were removed and inspected by the company, who on all hands admitted that, so far as it was concerned, the experiment was successful. The uppermost layers showed some indications of mould, but these disappeared as the cutting progressed. The clover and rye grass at the bottom of the silo were not touched. Handfuls of the ensilage were given to a herd of Polled Angus belonging to Mr Mackenzie. Without exception, they ate it eagerly. Mr Mackenzie anticipates that, from the fact of the door not being completely air-tight, there will be a quantity of waste in its neighbourhood. Part of the moisture, too, has been lost through the floor of the silo being level with the base of the doorway. The company, after closely examining the ensilage, and many of them securing samples, proceeded to Harcus farm-steading, where the other silo is situated.

The silo at Harcus was excavated early in May; commenced building May 15; finished building June 16. Dimensions inside, 30 feet long by 12 feet wide and 13 feet deep. Walls at upper end and both sides 12 inches thick, that at lower end 15 inches; floor 6 inches thick, and quite level. Walls and floor composed of concrete, made of 7 parts of gravel and sand to 1 of best Portland cement. The pillars to support roof, which are 11 in number, 5 feet high, 1 foot square, and placed about 7 feet apart, are made of concrete, 3 to 1, as is also the smooth facing on the whole inside of silo, and on such external parts as are visible. The roof is of home-grown fir, and covered with roofing felt; it has projecting eaves to throw the drip clear of the walls. The silo is constructed in sloping ground; at the lower end the floor is 5 feet below the surface, and at the upper end 11½ feet; the material removed in the excavation is heaped against the sides. In the lower end there is a door on the level of the ground for paying out the ensilage. This was filled up with double boarding and 4 inches of rammed sawdust between. The total cost has been—Excavation, £4, 16s.; Building, including cement, £57, 15s.; roofing and joiners' wages helping with framing, £12, 5s.; cartage, £4, 4s.; total, £79. This is the entire cost of the building itself. But there was a further expense, for planking to cover the ensilage, to fill up the spaces between the pillars, for making the boxes, which, when filled with gravel, form the weights, and for joiners' wages knocking the boxes together, which altogether amounted to £12, 10s. more. It is customary to count only the actual cost of the building in calculating how much a silo costs per ton of capacity. Taking ensilage to run 45 cubic feet to the ton, the capacity of the Harcus silo is 104 tons; at this rate the cost per ton of capacity at £79 is a little over 15s.; but if the full sum of £91, 10s. be taken, it exceeds 17s. 6d. The building is altogether more highly finished than was perhaps actually necessary, and it could be made quite substantial and good for say 12s. per ton of capacity. The filling commenced July 30; by the 8th August the silo was full to the wall head. The material put in was in consecutive order, about 6 tons of clover and rye grass, 4½ tons of coarse plantation grass, 7½ tons of oats after green crop, sown out, 3 tons rough plantation grass, 19 tons oats off lea, and 4 tons of plantation grass; total, 44 tons. By the 16th August it had subsided 5½ feet, under a pressure of between 50 and 60 lbs. per superficial foot. The silo was accordingly uncovered, and about 24 tons of oats, with some peas and tares sown along with it, were put in and additional weight was put on, making it about 150 lbs. per superficial foot. This greater pressure caused the subsidence of both the former filling and the second filling, and on September 5th the top of the ensilage was about 4½ feet below the wall head. It was again uncovered, and about 6 tons of plantation grass and 3 tons of oats and peas were put in, and the silo was finally closed on September 11. It continued to subside gradually for several weeks, and is now on the average 3½ feet down. There has been no subsidence for six weeks or two months, During the whole time, from the commencement of the first filling till the subsidence after the last filling finally ceased, a test for heating was continuously in operation, by means of an iron rod thrust into the mass, between 8 and 9 feet long. At no time was there any heat to be detected greater than just enough to enable one to say that the rod was not actually cold, and latterly there was no heat at all. After the silo was filled for the second time, a pungent odour began to come through the doorway, and continued, sometimes slighter and sometimes stronger, for some weeks after the third filling. On December 8 the silo was opened; about 6 inches of the ensilage in front of the door and about 3 inches on the top was mouldy. After this was removed the ensilage was found in good order; it emitted a strong odour, somewhat resembling draff, and a good quantity of the corn was quite green. It was offered to 8 Ayrshire and Alderney dairy cows and to 9 polled Angus cows. Some took it at once, some after a little, and all had eaten it before twenty-four hours had elapsed. There was no heat in the ensilage, either on the top or at the door, when the silo was opened. The cost of cutting, hauling, tramping, putting on the weights, and removing them for each refilling, and replacing them in position, has been £24, 7s., equal to 6s. 6½d. per ton stored. It is only right to say that this is greatly in excess of what was actually necessary. In the anxiety to ensure success there was an exceptional amount of tramping performed, and the cost was also considerably increased from the fact that strips out of fields were cut, a more tedious, and consequently expensive, operation per acre than the cutting whole fields at once. It is left to practical readers to place their own values on the different materials employed to fill the silo. At the bottom of the silo there is an accumulation of juice, which Mr Mackenzie proposes to use with bran. The oats, which were very strong in their growth, were found to be slightly fermented, owing, it is supposed, to the air not being thoroughly pressed out of the stalks. This of course might be avoided by chaffing it. Despite the little fermentation, the cattle ate the oats readily and in decided preference to ordinary straw. During the past ten days Alderney, Ayrshire, and Polled Angus cows alike have been regularly foddered with two meals of the ensilage each day. They have received in addition a small quantity of turnips, but these will be discontinued when the cows become more accustomed to the ensilage. The cattleman states that already there is a perceptible improvement in the quality of the milk. It is contemplated by Mr Mackenzie to test minutely the effect of the ensilage upon the cattle, when they are feeding on it exclusively. Each meal at present consists of 15 lbs. of the ensilage. All the juice is thus retained.

The inspection over, and luncheon having been partaken of, Mr F. N. Menzies proposed the health of Mr and Mrs Mackenzie. When Mr Mackenzie was placed upon the committee of the Highland and Agricultural Society to investigate the question of ensilage, Mr Menzies said, he at once came forward, and offered to take upon himself all the work and trouble of testing it. He could only say that the Society, and indeed the agricultural public of Scotland, were greatly indebted to him for what he had done. Mr Mackenzie, in his reply, expressed his willingness to exhibit the further results of the experiments to any one who wished. He had had the assistance of the Society's committee, and the still greater assistance, and zeal, and energy of his excellent manager, Mr Brydone.

PREMIUMS AWARDED BY THE SOCIETY IN 1883-84.

I.—REPORTS, 1884.

AGRICULTURAL.

1. James Tait, 4 Argyle Crescent, Joppa, for a Report on the Agriculture of the County of Lanark,	£40	0	0
2. William H. Ralston, Culmore, Stoneykirk, for a Report on the Agriculture of the County of Wigtown,	25	0	0
3. Professor Wallace, Royal Agricultural College, Cirencester, for a Report on the Food of Scotch Hill Stock, and its Chemical Composition,	20	0	0
4. James Barr, jun., Whiteshaw, Carluke, for a Report on the Application of Town Sewage in Agriculture and the Effect of the Herbage on the Animal System,	15	0	0
5. James Tait, 4 Argyle Crescent, Joppa, for a Report on the Agriculture of the County of Stirling,	10	0	0
6. George Bruce, 35 Market Street, Aberdeen, for a Report on Cultivating Grasses in Scotland,	10	0	0
7. John Milne, M.A., King Edward, for a Report on Feeding Stock with different kinds of Food,	10	0	0
8. Alexander Macdonald, Sub-Editor, "North British Agriculturist," Edinburgh, for a Report on the Blackfaced Breed of Sheep,	5	0	0
9. David Archibald, Awamoa, Oamaru, Otago, New Zealand, for a Report on the Blackfaced Breed of Sheep,	5	0	0

FORESTRY.

10. W. F. Gunn, Nutwood, Strathpeffer, for a Report on the Woods, Forests, and Forestry in the County of Ross,	10	0	0
11. Robert Hutchison of Carlowrie, for a Report on Old and Remarkable Horse-Chestnut Trees in Scotland,	5	0	0
12. Robert Hutchison of Carlowrie, for a Report on Old and Remarkable Walnut Trees in Scotland,	5	0	0
13. Robert Hutchison of Carlowrie, for a Report on the Disastrous Gales of Season 1881–82,	5	0	0
14. John B. Webster, 100 West Graham Street, Glasgow, for a Report on the Most Suitable Trees to be left as Standards,	5	0	0
	£170	0	0

II.—GLASGOW SHOW, 1882.

1. John Richardson & Son, Carlisle—Special Grant for Merits of Seed Cleaner, and an encouragement for further Improvement,	£10	0	0

III.—INVERNESS SHOW, 1883.

Class I.—CATTLE.

SHORTHORN.

TWEEDALE GOLD MEDAL. Best Shorthorn Bull in the Yard.

1. James Bruce, Burnside, Fochabers, "Goldfinder" (£20, less 9s. 4d. income-tax),	£19	10	8

Section 1. BULL calved before 1st January 1881.

1. James Bruce, Burnside, Fochabers, "Master Harbinger" (40324),	20	0	0
2. James A. Gordon, Udale, Invergordon, "Rob Roy" (45484),	10	0	0
3. The Duke of Richmond and Gordon, K.G., Gordon Castle, Fochabers, "Good Hope" (44883),	5	0	0
Breeder of Best Bull—William Handley, Greenhead, Milnethorpe. Silver Medal,	0	16	0
V. H. C., Hugh Fraser, Balloch of Culloden, Inverness, "Waterloo Beau." H. C., James Durno, Jackstown, Rothie Notman, "Claymore."			
Carry forward,	£55	6	8

	Brought forward,	£55	6 8

SECTION 2. BULL calved on or after 1st January 1881.

1.	Alexander Lawson, Brae Lossie, Elgin, "Gambetta" (46394),	20	0 0
2.	John Hunter, Dipple, Fochabers, "Glenmore,"	10	0 0
3.	James M'William, Stoneytown, Keith, "Sir Thomas" (47116),	5	0 0
V. H. C., James Main, Burns, Fordyce, Portsoy, "Rosse." H. C., Thomas Adam of Lynegar, Wick, "Othello" (46816).			

SECTION 3. BULL calved on or after 1st January 1882.

1.	James Bruce, Burnside, Fochabers, "Goldfinder,"	10	0 0
2.	George Inglis of Newmore, Invergordon, "Baron Booth 3rd,"	5	0 0
3.	George Dean, Brangan, Portsoy, "Enterprise,"	3	0 0
V. H. C., The Duke of Richmond and Gordon, K.G., Gordon Castle, Fochabers, "St Patrick."			

SECTION 4. COW of any age.

1.	James M'William, Stoneytown, Keith, "Golden Wreath,"	15	0 0
2.	James M'William, Stoneytown, Keith, "Merry Maiden,"	8	0 0
3.	James E. B. Baillie of Dochfour, Inverness, "Sweet Pea,"	4	0 0
V. H. C., James E. B. Baillie of Dochfour, Inverness, "Strawberry Bud." H. C., James Watt, Mains of Mulben, Keith, "Dorothy." C., W. A. Mitchell, Auchnagathle, Whitehouse, Aberdeen, "Amethyst;" The Duke of Richmond and Gordon, K.G., Gordon Castle, "Lustre 15th;" The Duke of Richmond and Gordon, K.G., Gordon Castle, "Flower of the Forest."			

SECTION 5. HEIFER calved on or after 1st January 1881.

1.	James Bruce, Burnside, Fochabers, "Sir Arthur's Princess,"	10	0 0
2.	The Duke of Richmond and Gordon, K.G., Gordon Castle, "Rosewood 13th,"	5	0 0
3.	James Bruce, Burnside, Fochabers, "Florentia 6th,"	3	0 0
V. H. C., James E. B. Baillie of Dochfour, Inverness, "Butter Scotch." H. C., James E. B. Baillie of Dochfour, Inverness, "Eleanor Windsor."			

SECTION 6. HEIFER calved on or after 1st January 1882.

1.	James Durno, Jackstown, Rothie Norman "Chief Blossom,"	8	0 0
2.	James Bruce, Burnside, Fochabers, "Marigold 7th,"	4	0 0
3.	Thomas Adam of Lynegar, Wick, "Lady Graceful,"	2	0 0
V. H. C., James Watt, Mains of Mulben, Keith, "Annetta." H. C., Alexander Lawson, Brae Lossie, Elgin, "Idalia." C., James M'William, Stoneytown, Keith, "Marie;" The Duke of Richmond and Gordon, K.G., Gordon Castle, Fochabers, "Peach Blossom 18th."			

AYRSHIRE.

SECTION 7. BULL calved before 1st January 1882.

1.	Robert Wardrop, Garlaff, Old Cumnock, "King Coil" (431),	20	0 0
2,	D. C. Willison, Dalpeddar, Sanquhar, "Duncan" (350),	10	0 0
5.	Andrew Hoggan, jun., Busby Farms, Busby, Lanarkshire, "Baron of Over Milton" (351),	5	0 0
Breeder of Best Bull—Robert Wardrop, Garlaff, Old Cumnock, Silver Medal,		0	16 0
C., John Lorne Stewart, Island of Coll, Oban, "Lowland Chief."			

SECTION 8. COW in Milk of any age.

1.	Andrew Hoggan, jun., Busby Farms, Busby, Lanarkshire, "Kilbirnie,"	15	0 0
2.	Hector Morrison, Morrison Cottage, Kenneth Street, Inverness, "Lady,"	8	0 0

SECTION 9. COW in Calf of any age, or HEIFER in Calf, calved before 1st January 1881.

1.	Duncan Keir, Bucklyvie, "Maggie,"	15	0 0
2.	John Lindsay, Thornhill, Stewarton, "Jean of Thornhill" (1897),	8	0 0
3.	Andrew Hoggan, jun., Busby Farms, Busby, "Auchendennan of Busby,"	4	0 0
V. H C., Andrew Hoggan, jun., Busby Farms, Busby, "Barmoorhill of Busby."			
	Carry forward,	£253	2 8

Brought forward, £253 2 8

SECTION 10. HEIFER calved on or after 1st January 1881.

1. Robert Wardrop, Garlaff, Old Cumnock, "Nancy Lee," . . . 10 0 0
2. Andrew Hoggan, jun., Busby Farms, Busby, "Jenny Lind of Busby," . 5 0 0
3. John Lorne Stewart, Island of Coll, Oban, "Belle of Coll," . . . 3 0 0

C., John Lorne Stewart, Island of Coll, Oban, "Tit-Bit."

SECTION 11. HEIFER calved on or after 1st January 1882.

1. Robert Wardrop, Garlaff, Old Cumnock, "Bonnie Jean," . . . 8 0 0
2. Andrew Hoggan, jun., Busby Farms, Busby, "Auchengilsie of Busby," . 4 0 0

POLLED ANGUS OR ABERDEEN.

SECTION 12. BULL calved before 1st December 1880.

1. R. F. O. Farquharson of Haughton, Alford, Aberdeen, "The Black Knight," (1809), ... 20 0 0
2. John Strachan, Montcoffer Mains, Banff, "Editor" (1260), . . . 10 0 0
3. William James Tayler, Rothiemay House, Huntly, "Sir Maurice" (1319), . 5 0 0

Breeder of Best Bull—David A. Pearson of Johnston, Laurencekirk. Silver Medal, 0 16 0

SECTION 13. BULL calved on or after 1st December 1880.

1. Lord Tweedmouth, Guisachan, Beauly, "Tip Top" (1828), . . . 20 0 0
2. George Reid, Baads, Peterculter, "Sir George of Baads" (2342), . . 10 0 0
3. George Cran, Morlich, Towie, "Cupid of Morlich" (2039), . . . 5 0 0

V. H. C., Alex. Bowie, Mains of Kelly, Arbroath, "Rajah." H. C., James Argo, Cairdseat, Udny, "Standard" (1829).

SECTION 14. BULL calved on or after 1st December 1881.

1. James Argo, Cairdseat, Udny, "Iliad," 10 0 0
2. G. S. Grant, Auchorachan, Ballindalloch, "Prince of Livet" (2303), . . 5 0 0
3. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Solomon" (2349), . 3 0 0

V. H. C., The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Comus." H. C., A. F. & A. Leslie, Braco, Keith, "Sir Michael." C., John Stewart, Auchindellan, Clatt, Kinnethmont, "Emilius."

SECTION 15. COW of any age.

1. Lord Tweedmouth, Guisachan, Beauly, "Pride of Aberdeen 18th" (4321), . 15 0 0
2. Robert Anderson, Daugh, Tarland, "Rosie of Daugh" (4840), . . 8 0 0
3. George Wilken, Waterside of Forbes, Alford, Aberdeenshire, "Sybils Darling" (4050), ... 4 0 0

V. H. C., John Strachan, Moncoffer Mains, Banff, "Bella 3rd" (4123). H. C., George Reid, Clinterty, Blackburn, Aberdeen, "Isla 3rd" (4376). C., R. F. O. Farquharson, of Haughton, Alford, Aberdeen, "Lilly of Haughton 3rd" (4366).

SECTION 16. HEIFER calved on or after 1st December 1880.

1. George Wilken, Waterside of Forbes, Alford, Aberdeen, "Waterside Matilda 2nd" (6312), ... 10 0 0
2. George Reid, Baads, Peterculter, Aberdeen, "Isle of Beauty" (5935), . . 5 0 0
3. John Hannay, Gavenwood, Banff, "Pride of Aberdeen 26th" (Lady Paramount) (4560), ... 3 0 0

V. H. C., W. M'Combie of Easter Skene, Skene, "Alexandra" (5774). H. C., Her Majesty the Queen, Abergeldie Mains, Ballater, "Drusilla" (5090). C., Thomas F. Inkson, Kinermony, Aberlour, "Kate of Kinermony" (5706).

SECTION 17. HEIFER calved on or after 1st December 1881.

1. John Hannay, Gavenwood, Banff, "Favonia," 8 0 0
2. W. M'Combie of Easter Skene, Skene, "Bona," 4 0 0
3. Her Majesty the Queen, Abergeldie Mains, Ballater, "Princess Beatrice" (5055), ... 2 0 0

Carry forward, £430 18 8

Brought forward, £430 18 8

V. H. C., John Smith, Cragganmore, Ballindalloch, "Flora Macdonald"; W. James Tayler, Rothiemay House, Huntly, "Maid of Isla" (6196). H. C., Lord Tweedmouth, Guisachan, Beauly, "Viola of Guisachan (6221)"; Lord Tweedmouth, Guisachan, Beauly, "Gloriosa" (6212). C., R. Anderson, Daugh, Tarland, "Maid of Fife"; Thomas Ferguson, Kinnochtry, Cupar-Angus, "Victoria 2nd of Kinnochtry."

GALLOWAY.

SECTION 18. BULL calved before 1st January 1882.

1. F. E. Villiers, Closeburn Hall, Thornhill, "John Highlandman of Closeburn" (1905), ... 20 0 0
Breeder of Best Bull—W. & J. Shennan, Balig, Kirkcudbright, Silver Medal, 0 16 0

SECTION 19. COW of any age.

1. F. E. Villiers, Closeburn Hall, Thornhill, "Forest Queen of Closeburn" (4513). 15 0 0

SECTION 20. HEIFER calved on or after 1st January 1881.

1. Alexander M'Cowan, Newton Airds, Dumfries, "Semiramis 3rd of Tarbreoch," 10 0 0
2. Alexander M'Cowan, of Newton Airds, Dumfries, "Helena 4th of Wedholme" (4163), ... 5 0 0

SECTION 21. HEIFER, calved on or after 1st January 1882.

1. F. E. Villiers, Closeburn Hall, Thornhill, "Vidette of Closeburn" (4517), . 8 0 0
2. Thomas Biggar & Son, Chapelton, Dalbeattie, "Ranee 4th" (5544), . . 4 0 0
V. H. C., Thomas Biggar & Son, Chapelton, Dalbeattie, "Colia 2nd,"

HIGHLAND.

SECTION 22. BULL, calved before 1st January 1880.

1. Duncan M'Diarmid, Camusericht, Rannoch, "Fear-a-Bhaile," . . . 20 0 0
2. John Mackintosh, South Kinrara, Aviemore, "Ossian." . . . 10 0 0
3. John Stewart of Ensay, Harris, "Fear-a-Bhaile," 5 0 0
Breeder of Best Bull—Duncan M'Diarmid, Camusericht, Rannoch. Silver Medal, 0 16 0
H. C., Lord Middleton, Applecross, "Gille Ruadh." C., Mackintosh of Mackintosh, Moy Hall, Inverness, "Raahl,"

SECTION 23. BULL, calved on or after 1st January 1880.

1. John Stewart, of Ensay, Harris, "The Gardener," 20 0 0
2. J. M'Gillivray, Ballochroan, Kingussie, "Cailean," 10 0 0
3. The Earl of Seafield, Castle Grant, Grantown, "Barran Buidhe," . . 5 0 0
H. C., David Carnegie, of Stronvar, Lochearnhead, "Comhall."

SECTION 24. BULL, calved on or after 1st January 1881.

1. George Willison, Ardlarach House, Luing, Easdale, Oban, "Norman," . . 10 0 0
2. James Duncan, of Benmore, Kilmun, Cowal, "Coirintee," . . . 5 0 0
3. Alexander M'Donald, Nether Largie, Kilmartin, "Brochriach," . . 3 0 0
H. C., John Stewart, of Ensay, Harris' "Sughay." C., George A. Cox, Invertrossachs, Callander, "Fear-a-Bhaile."

SECTION 25. BULL, calved on or after 1st January 1882.

1. Allan Macgillivray, Gordon Hall, Kingussie, "Murach," . . . 5 0 0
2. Duncan M'Diarmid, Camusericht, Rannoch, "Pairig Og," . . . 3 0 0
3. James Duncan, of Benmore, Kilmun, Cowal, "Glen Sanda," . . . 1 0 0
H. C., Alexander Macdonald, Balranald, Lochmaddy, "Uilleam." C., The Earl of Seafield, Castle Grant, Grantown, "Alastair."

Carry forward, £591 10 8

Brought forward,	£591	10	8

SECTION 26. COW of any age.

1. John Stewart, of Ensay, Harris, "Guanach,"	15	0	0
2. George Willison, Ardlarach House, Easdale, Oban, "Cladvale,"	8	0	0
3. Robert Anderson of Lochdhu, Nairn,	4	0	0

V. H. C., Colonel G. Gardyne of Glenforsa, Aros, Mull, "Ban-a-Mhulleach. H. C., James Duncan of Benmore, Kilmun, Cowal, "Highland Mary." C., Mackintosh of Mackintosh, Moy Hall, Inverness, "Flora."

SECTION 27. HEIFER, calved on or after 1st January 1880.

1. John Stewart of Ensay, Harris, "Donnach,"	10	0	0
2. John Stewart of Ensay, Harris, "Ribhinn Og,"	5	0	0
3. James Duncan of Benmore, Kilmun, Cowal, "Mhaighdean Bhan,"	3	0	0

V. H. C., John Mackintosh, South Kinrara, Aviemore, "Flora Og." H. C., The Earl of Seafield, Castle Grant, Grantown, "Bynack." C., John Mackintosh, South Kinrara, Aviemore, "Lillie."

SECTION 28. HEIFER, calved on or after 1st January 1881.

1. John Stewart of Ensay, Harris, "Guanach 1st"	8	0	0
2. John Stewart of Ensay, Harris, "Molach Dearg,"	4	0	0
3. George Willison, Ardlarach House, Luing, Easdale, Oban, "Nora,"	2	0	0

V. H. C., George Willison, Ardlarach House, Luing, Easdale, Oban, "Ruo Vore." H. C., John Mackintosh, South Kinrara, Aviemore, "Mary." C., John Mackintosh, South Kinrara, Aviemore, "Lady Og."

SECTION 29. HEIFER, calved on or after 1st January 1882.

1. John Stewart of Ensay, Harris, "Guanach 2nd,"	5	0	0
2. James Duncan of Benmore, Kilmun, Cowal, "Highland Charmer,"	3	0	0
3. James Duncan of Benmore, Kilmun, Cowal, "Jessie,"	1	0	0

C., The Earl of Seafield, Castle Grant, Grantown, "Kinvachie."

SECTION 30. FAMILY PRIZE--COW of any age, and three or more of her Descendants, Male or Female.

1. James Duncan of Benmore, Kilmun, Cowal,	15	0	0
2. The Earl of Seafield, Castle Grant, Grantown,	8	0	0
3. Robert Anderson of Lochdhu, Nairn,	4	0	0

FAT STOCK.

SECTION 31. HIGHLAND OX calved before 1st January 1880.

1. The Duke of Sutherland, K.G., Dunrobin Mains, Golspie,	5	0	0
2. The Earl of Seafield, Castle Grant, Grantown,	3	0	0

V. H. C. The Duke of Sutherland.

SECTION 32. HIGHLAND OX, calved on or after 1st January 1880.

1. Earl Cawdor, Cawdor Castle, Nairn,	4	0	0
2. Earl Cawdor, Cawdor Castle, Nairn,	2	0	0

V. H. C., Earl Cawdor, Cawdor Castle, Nairn. H.C., The Duke of Sutherland, K.G., Dunrobin Mains, Golspie.

SECTION 33. SHORTHORN OX, calved before 1st January 1881.—No Entry.

SECTION 34. SHORTHORN OX, calved on or after 1st January 1881.

1. James Sutor, The Collie, Fochabers,	4	0	0
2. George Shand, Ordens, Boyndie, Banff,	2	0	0

SECTION 35. POLLED OX, calved before 1st January 1881.—Not Forward.

SECTION 36. POLLED OX, calved on or after 1st January 1881.

1. George Wilken, Waterside of Forbes, Alford, Aberdeen,	4	0	0
Carry forward,	£710	10	8

Brought forward, £710 10 8

SECTION 37. OX, of any other Pure or Cross Breed, calved before 1st January 1881.

1. John Cran, Kirkton, Bunchrew (cross between Shorthorn and Cross), . . 5 0 0
2. William Cairns, Belhie, Auchterarder (non-pedigreed Shorthorn), . . 3 0 0

SECTION 38. OX, of any other Pure or Cross Breed calved on or after 1st January 1881.

1. John Cran, Kirkton, Bunchrew (cross between Shorthorn and Polled), . . 4 0 0
2. John Cran, Kirkton, Bunchrew (cross between Shorthorn and Polled), . . 2 0 0

V. H. C., William Francis Boden, Scotsburn, Delny (cross between Shorthorn and Highland). H.C., James Fletcher of Rosehaugh, Avoch (cross between Shorthorn and Cross).

SECTION 39. CROSS-BRED HEIFER, calved before 1st January 1881.

1. Mrs Phœbe Dunbar Dunbar of Seapark, Kinloss, Forres (cross between Shorthorn and Cross), ... 5 0 0

SECTION 40. CROSS-BRED HEIFER, calved on or after 1st January 1881.

1. William Peterkin, Dunglass, Conon Bridge (cross between Shorthorn and Cross), 4 0 0

EXTRA CATTLE.

Very Highly Commended.

Shorthorn Bull, "Rosario 2nd" (42299), winner of First Prize at Glasgow, 1882, James A. Gordon, Udale, Invergordon, ... 5 0 0
Ayrshire Bull, "Pretender" (191), winner of First Prize at Glasgow, 1882, Andrew Hoggan, jun., Busby Farms, Lanarkshire, . . Medium Gold Medal, 6 2 0
Polled Angus or Aberdeen Bull, "Prince Albert of Baads" (1336), winner of First Prize at Kelso, 1880, Robert Anderson, Daugh Tarland, Medium Gold Medal, 6 2 0
Cross Ox, The Duchess of Sutherland, Tarbat Parkhill, . Medium Gold Medal, 6 2 0

Highly Commended.

Shorthorn Heifer, "Lily," John Cran, Kirkton, Bunchrew, Inverness, . . 3 0 0
Cross Ox, The Duchess of Sutherland, Tarbat, Parkhill, . Minor Gold Medal, 3 15 0
Highland Heifer, The Duke of Sutherland, K.G., Dunrobin, Minor Gold Medal, 3 15 0

Commended.

Highland Heifer, The Duke of Sutherland, K.G., Dunrobin, . Silver Medal, 0 16 0
Cross Cow, "Dandy," James Fletcher of Rosehaugh, Avoch . Silver Medal, 0 16 0
Cross Ox, John Stirling of Fairburn, Muir of Ord, . . . Silver Medal, 0 16 0

£769 14 8

CLASS II.—HORSES.

FOR AGRICULTURAL PURPOSES.

STALLION to travel the district of the Inverness Show in Season 1883.

Peter M'Robbie, Sunnyside, Aberdeen, "Gilderoy," £100 0 0

SECTION 1. STALLION, foaled before 1st January 1880.

1. Alex. M'Cowan, Newton Airds, Dumfries, "Corsewall" (1420) . . . 25 0 0
2. David Riddell, Blackhall, Paisley, "Tip Top," 18 0 0
3. Lawrence Drew, Merryton, Hamilton, "Bold Briton," 10 0 0

Breeder of Best Stallion—William Fraser, Barncrosh, Ringford, . Silver Medal, 0 16 0

V. H. C., William Wyllie, Princes Street Cottage, Perth, "British Commander" (1981). H.C., Alex. M'Robbie, Sunnyside, Aberdeen, "Gilderoy" (1438).

SECTION 2. ENTIRE COLT, foaled on or after 1st January 1880.

1. David Riddell, Blackhall, Paisley, "Sir Windham," 20 0 0
2. James M'Nab, Glenochil House, Menstrie, "Lord Kelburne" (2253), . 15 0 0
3. William Wyllie, Princes Street Cottage, Perth, "Logie the Laird" (2237), . 8 0 0

V. H. C., Lawrence Drew, Merryton, Hamilton, "Royal Sandy." H. C., Peter Ferguson, Rock Cottage, Renfrew, "Windsor" (2509).

Carry forward, £196 16 0

Brought forward, £196 16 0

SECTION 3. ENTIRE COLT, foaled on or after 1st January 1881.

1. David Riddell, Blackhall, Paisley, "Bloomsberry," 15 0 0
2. The Earl of Strathmore, Glamis Castle, Glamis, "Morning Star," . . 8 0 0
3. Alex. M'Robbie, Sunnyside, Aberdeen, "Grand Master, ... 4 0 0

V. H. C., Alex. M'Robbie, Sunnyside, Aberdeen, "Havelock" (2161). H. C., R. J. Mackay, Burgie Lodge, Forres.

SECTION 4. ENTIRE COLT, foaled on or after 1st January 1882.

1. David Riddell, Blackhall, Paisley, ... 10 0 0
2. Lawrence Drew, Merryton, Hamilton, ... 5 0 0
3. Lawrence Drew, Merryton, Hamilton, ... 3 0 0

V.H.C., James Sutor, The Collie, Fochabers, "Strathspey." H.C., Wm. Stevenson, Lochgrog, Bishopriggs, "Baron Wolseley."

SECTION 5. MARE (with Foal at foot), foaled before 1st January 1880.

1. J. F. Murdoch, Hallside, Newton Mearns, "Rosie," 20 0 0
2. D. M. Ross, yr. of Cromarty, Cromarty, "Bloom," 10 0 0
3. James Sutor, The Collie, Fochabers, "Rosebud" (657) 5 0 0

H. C., James Watt, Mains of Mulben, Keith, "Kate."

SECTION 6. MARE (in Foal), foaled before 1st January 1880.

1. Lawrence Drew, Merryton, Hamilton, "Queen," 20 0 0
2. Alexander Baird of Urie, Stonehaven, "Bonnie Jean" (982), . . . 10 0 0
3. D. C. Willison, Dalpeddar, Sanquhar, "Pride of Nith," 5 0 0

V. H. C., William Walker, Torbrex, Stirling, "Rosie." H. C., William Walker, Torbrex, Stirling, "Gipsy Queen." C., James Watt, Mains of Mulben, Keith, "Luck."

SECTION 7. FILLY, foaled on or after 1st January 1880.

1. Alexander Baird of Urie, Stonehaven, "Nazli," 10 0 0
2. Major L. D. Gordon Duff of Drummuir, Keith, "Lily o' the Dale," . . 5 0 0
3. William M'Donald, Wester Moy, Forres, "Bell," 3 0 0

H. C., David Forrester, Balquhidderock, Bannockburn, "Jeanie." C., William M'Donald, Wester Moy, Forres, "Mary."

SECTION 8. FILLY, foaled on or after 1st January 1881.

1. David Riddell, Blackhall, Paisley, "The Queen," 8 0 0
2. Alexander M'Cowan, Newton Airds, Dumfries, "Moss Rose," . . . 4 0 0
3. John Marr, Cairnbrogie, Oldmeldrum, "Darling 3d," 2 0 0

V. H. C., Lawrence Drew, Merryton, Hamilton. H. C., G. Duff Dunbar, Ackergill Tower, Wick, "Young Sultana." C., James Jenkins, New Elgin, Elgin, "Sally"; D. M. Ross, yr. of Cromarty, Cromarty.

SECTION 9. FILLY, foaled on or after 1st January 1882.

1. George Alston, Loudoun Hill House, Darvel, "Mayflower," . . . 6 0 0
2. Lawrence Drew, Merryton, Hamilton, ... 3 0 0
3. John Robertson of Rhynie, Fearn, "Nelly," 1 0 0

V. H. C., John Hunter, Dipple, Fochabers, "Norma." H.C., D. M. Ross, yr. of Cromarty, Cromarty. C., R. J. Mackay, Burgie Lodge, Forres.

SECTION 10. DRAUGHT GELDING, foaled before 1st January 1880.

1. James Fletcher of Rosehaugh, Avoch, "Sharp," 5 0 0
2. John Robertson of Rhynie, Fearn, "Scot," 3 0 0
3. John Hunter, Dipple, Fochabers, "Prince Dick," 1 0 0

SECTION 11. DRAUGHT GELDING, foaled on or after 1st January 1880.

1. James Fletcher of Rosehaugh, Avoch, "Clyde," 5 0 0
2. William M'Donald, Wester Moy, Forres, ... 3 0 0

Carry forward. £370 16 0

Brought forward, £370 16 0

ROADSTERS.

SECTION 12. MARE or GELDING, suitable for Carriage, foaled before 1st January 1880.

1. Allan R. Mackenzie, yr. of Kintail, Clunes, Inverness-shire, Mare, "Molly," . 15 0 0
2. Alexander Russell, Myreside, Elgin, Mare, "Rose," 8 0 0
V. H. C., Macrae & Dick, Baron Taylor's Lane, Inverness, Mare, "Delny."

SECTION 13. MARE or GELDING, suitable for Carriage, foaled on or after 1st January 1880,

1. Charles R, Gallie, Inverness, Gelding, "Jamie," 15 0 0
2. Duncan Cameron, Fettes, Inverness, Gelding, "Deerfoot," . . . 8 0 0
V. H. C., Charles R. Gallie, Inverness, Mare, "Mary."

SECTION 14. MARE or GELDING, suitable as hackney or roadster between 14 and 15 hands.

1, J. C. Cuninghame of Foyers, Inverness, Gelding, "Charlie," . . . 10 0 0
2. C. J. Merry, Belladrum, Beauly, Gelding, ... 5 0 0
V. H. C., Alex. Colvin, Crown, Inverness, Mare, "Maggie,"

EXTRA HORSES.

Very Highly Commended.

Clydesdale Mare, "Sally," Dr Brougham, Culduthel, Inverness, Med. Gold Medal, 6 2 0

Commended,

Thoroughbred Stallion, "Waverley," Alex, Colvin, Crown, Inverness, Silver Medal, 0 16 0
Basuto Pony Stallion, "The Kaffir," C. D. Steuart, Dalguise, Dunkeld, Silver Medal, 0 16 0

PONIES.

SECTION 15. HIGHLAND STALLION, 15 hands and under.

1. Lord Tweedmouth, Guisachan, Beauly, "Kit," 10 0 0
2. Dr Brougham, Culduthel, Inverness, "Highland Laddie," . . . 5 0 0
3, Alex. M'Donald, Balranald, Lochmaddy, "Tom," 3 0 0

SECTION 16. HIGHLAND MARE or GELDING, between 13 and 14½ hands.

1. Allan R. Mackenzie, yr. of Kintail, Clunes, Inverness, Mare, "Ladybird," . 6 0 0
2. Allan R. Mackenzie, yr. of Kintail, Clunes, Inverness, Mare, "Butterfly," . 3 0 0
3. Chas. Innes, Balifeary, Inverness, Mare, "Nelly," 1 0 0

SECTION 17. MARE or GELDING, between 12½ and 14 hands. Not Forward.

SECTION 18. MARE or GELDING under 12½ hands.

1. Wm. Couper, Antfield, Inverness, Gelding, "Shaggy," . . . 6 0 0
2. W. G. Mundell, Inverlaul, Lochbroom, Gelding, "Donald,' . . . 3 0 0
3. A. M'Donald, Chapelton, Muir of Ord, Mare, "Beauty," . . . 1 0 0

£477 10 0

CLASS III.—SHEEP.

BLACKFACED.

SECTION 1. TUP above 1 Shear.

1. David Foyer, Knowehead, Campsie, ... £10 0 0
2. John Fleming, Ploughland, Strathaven, ... 6 0 0
3. John Fleming, Ploughland, Strathaven, ... 3 0 0
V. H. C., David Foyer, Knowehead, Campsie. H. C., Robert Buchanan, Letter, Killearn.

Carry forward, £19 0 0

Brought forward, £19 0 0

SECTION 2. SHEARLING TUP.

1. Charles Howatson of Glenbuck, Lanark, ... 10 0 0
2. Charles Howatson of Glenbuck, Lanark, ... 6 0 0
3. Charles Howatson of Glenbuck, Lanark, ... 3 0 0

V. H. C., John Fleming, Ploughland, Strathaven. H. C., John Fleming, Ploughland, Strathaven. C., John Fleming, Ploughland, Strathaven.

SECTION 3. Pen of 3 EWES above 1 Shear, with LAMBS.

1. Peter Robertson, Achilty, Dingwall, ... 8 0 0
2. P. M. Turnbull, Smithston, Gartly, ... 5 0 0
3. James Duncan of Benmore, Kilmun, Cowal, ... 2 0 0

V. H. C., James A. Gordon, Udale, Invergordon. H. C., Robert Buchanan, Letter, Killearn.

SECTION 4. Pen of 3 SHEARLING EWES or GIMMERS.

1. Lord Lovat, Garthbeg, Stratherrick, Gorthlick, Inverness, . . . 8 0 0
2. P. M. Turnbull, Smithston, Gartly, ... 5 0 0
3. Lord Lovat, Garthbeg, Stratherrick, Gorthlick, Inverness, . . . 2 0 0

V. H. C., Lord Lovat, Garthbeg, Stratherrick, Gorthlick. H. C., P. M. Turnbull, Smithston, Gartly. C., James Duncan of Benmore, Kilmun, Cowal.

CHEVIOT.

SECTION 5. TUP, above 1 Shear.

1. Walter Mundell, Muirfield House, Inverness, ... 10 0 0
2. Walter Mundell, Muirfield House, Inverness, ... 6 0 0
3. General Brown, C.B., Gordonbush, Brora, ... 3 0 0

V. H. C., Walter Mundell, Gollanfield, Fort-George Station. H. C., Donald M'Kenzie, Glenloy, Fort-William. C., Donald M'Kenzie, Glenloy, Fort-William.

SECTION 6. SHEARLING TUP.

1. Walter Mundell, Gollanfield, Fort-George Station, ... 10 0 0
2. Walter Mundell, Muirfield House, Inverness, ... 6 0 0
3. Walter Mundell, Gollanfield, Fort-George Station, ... 3 0 0

V. H. C., Walter Mundell, Gollanfield, Fort-George Station. H. C., Walter Mundell, Gollanfield, Fort-George Station. C., Walter Mundell, Muirfield House, Inverness.

SECTION 7. Pen of 3 EWES, above 1 Shear, with LAMBS.

1. Walter Mundell, Gollanfield, Fort-George Station, ... 8 0 0
2. Walter Mundell, Gollanfield, Fort-George Station, ... 5 0 0

SECTION 8. Pen of 3 SHEARLING EWES or GIMMERS.

1. John Baird of Knoydart, Inverguseran, Isle Ornsay, ... 8 0 0
2. Walter Mundell, Gollanfield, Fort-George Station, ... 5 0 0
3. Walter Mundell, Gollanfield, Fort-George Station, ... 2 0 0

V. H. C., John Baird of Knoydart, Inverguseran, Isle Ornsay.

BORDER LEICESTER.

SECTION 9. TUP, above 1 Shear.

1. A. J. Balfour of Whittinghame, M.P., Prestonkirk, ... 10 0 0
2. Duncan Cameron, Fettes, Inverness, ... 6 0 0
3. William Purves, Thurdistoft, Thurso, ... 3 0 0

SECTION 10. SHEARLING TUP.

1. A. J. Balfour of Whittinghame, M.P., Prestonkirk, ... 10 0 0
2. A. J. Balfour of Whittinghame, M.P., Prestonkirk, ... 6 0 0
3. Samuel Jack, Mersington, Coldstream, ... 3 0 0

V. H. C., A. J. Balfour of Whittinghame, M.P., Prestonkirk. H. C., W. S. Ferguson, Pictstonhill, Perth. George Simson, Courthill, Kelso.

Carry forward, £172 0 0

	Brought forward,	£172	0 0

SECTION 11. Pen of 3 EWES above 1 Shear.

1. W. S. Ferguson, Pictstonhill, Perth,		8	0 0
2. A. J. Balfour of Whittinghame, M.P., Prestonkirk,		5	0 0
3. Archibald Cameron, Killen, Avoch,		2	0 0

C., James Sutor, The Collie, Fochabers.

SECTION 12. Pen of 3 SHEARLING EWES or GIMMERS.

1. Samuel Jack, Mersington, Coldstream,		8	0 0
2. John Thompson, Baillieknowe, Kelso,		5	0 0
3. George Simson, Courthill, Kelso,		2	0 0

H. C., A. J. Balfour of Whittinghame, M.P., Prestonkirk. H. C., W. S. Ferguson, Pictstonhill, Perth.

LONG-WOOLLED OTHER THAN BORDER LEICESTER.

SECTION 13. TUP above 1 Shear.—No Entry.

SECTION 14. SHEARLING TUP.—No Entry.

SECTION 15. Pen of 3 EWES above 1 Shear.—No Entry.

SECTION 16. Pen of 3 SHEARLING EWES or GIMMERS.—No Entry.

SHROPSHIRE.

SECTION 17. TUP above 1 Shear.

1. Francis Gibson, Woolmet, Dalkeith,		8	0 0
2. The Earl of Mansfield, K.T., Scone Palace, Perth,		4	0
3. The Earl of Mansfield, K.T., Scone Palace, Perth,		2	0 0

SECTION 18. SHEARLING TUP.

1. The Earl of Strathmore, Glamis Castle, Forfar,		8	0 0
2. The Earl of Strathmore, Glamis Castle, Forfar,		4	0 0
3. Francis Gibson, Woolmet, Dalkeith,		2	0 0

V. H. C., Francis Gibson, Woolmet, Dalkeith. H. C., Archibald Cameron, Killen, Avoch.

SECTION 19. Pen of 3 EWES above 1 Shear.

1. Francis Gibson, Woolmet, Dalkeith,		6	0 0
2. Francis Gibson, Woolmet, Dalkeith,		3	0 0
3. The Earl of Mansfield, K.T., Scone Palace, Perth,		1	0 0

SECTION 20. Pen of 3 SHEARLING EWES or GIMMERS.

1. Francis Gibson, Woolmet, Dalkeith,		6	0 0
2. Francis Gibson, Woolmet, Dalkeith,		3	0 0

SHORT-WOOLLED OTHER THAN SHROPSHIRE.

SECTION 21. TUP above 1 Shear.—No Entry.

SECTION 22. SHEARLING TUP.

1. Walter Mundell, Stronchrubie, Assynt, Lairg,		3	0 0

SECTION 23. Pen of 3 EWES above 1 Shear.—No Entry.

SECTION 24. Pen of 3 SHEARLING EWES or GIMMERS.—No Entry.

	Carry forward,	£252	0 0

Brought forward, £252 0 0

EXTRA SECTIONS.

SECTION 25. Pen of 5 BLACKFACED WETHERS, not above 4 Shear.

1. James E. B. Baillie of Dochfour, Inverness, ... 3 0 0
2. John Arres Mather, Delnies, Nairn, ... 2 0 0

V. H. C., Lord Tweedmouth, Guisachan, Beauly. H. C., William Gordon, Auchallater, Braemar.

SECTION 26. Pen of 5 CHEVIOT WETHERS, not above 3 Shear.

1. The Duke of Sutherland, K.G., Dunrobin Mains, Golspie, . . . 3 0 0

SECTION 27. Pen of 5 HALF-BRED WETHERS not above 2 Shear.

1. Walter Mundell, Stronchrubie, Assynt, Lairg, ... 3 0 0

SECTION 28. Pen of 5 CROSS-BRED WETHERS, not above 2 Shear. No Entry.

£263 0 0

CLASS IV.—SWINE.

BLACK or BERKSHIRE.

SECTION 1. BOAR.

1. George Inglis of Newmore, Invergordon, ... £5 0 0
2. The Earl of Haddington, Tyninghame, Prestonkirk, ... 3 0 0

SECTION 2. SOW.

1. Sir Kenneth S. Mackenzie of Gairloch, Bart., Conon House, Conon Bridge, . 4 0 0
2. Duncan Forbes of Culloden, Inverness, ... 2 0 0

SECTION 3. Pen of 3 PIGS, not above 8 months old.

1. The Earl of Haddington, Tyninghame, Prestonkirk, ... 4 0 0
2. Captain Forsyth Grant of Ecclesgreig, Montrose, ... 2 0 0

SMALL BREED.

SECTION 4. BOAR.

1. No award.
2. John Thomson, Prospect Hill, Cathcart, ... 3 0 0

SECTION 5. SOW.

1. The Earl of Mansfield, K.T., Scone Palace, Perth, ... 4 0 0
2. John Thomson, Prospect Hill, Cathcart, ... 2 0 0

SECTION 6. Pen of 3 PIGS, not above 8 months old.

1. The Earl of Mansfield, K.T., Scone Palace, Perth, ... 0 0
2 John Thomson, Prospect Hill, Cathcart, ... 2 0 0
3. The Earl of Mansfield, K.T., Scone Palace, ... 1 0 0

EXTRA.

Very Highly Commended.

Sow, Large Breed, winner of first prize at Glasgow in 1882—The Earl of Haddington, Tyninghame, ... Minor Gold Medal, 3 15 0

Highly Commended.

Sow, Middle Breed—John Thomson, Prospect Hill, Cathcart, . Silver Medal, 0 16 0

Commended,

Boar, Large Breed, winner of first prize at Glasgow in 1882—The Earl of Haddington, Tyninghame, ... Medium Silver Medal, 0 10 6
Sow, Large Breed—Andrew Mackenzie, Dalmore, Alness, . Medium Silver Medal, 0 10 6

£41 12 0

Class V.—COLLIE DOGS.

Section 1. Long-Haired DOG, not above 6 years old.

1. John Fleming, Ploughland, Strathaven, "Drift,"	£2 0 0
2. Michael Anderson, Bishopmill, Elgin, "Tweed,"	1 0 0
V. H. C., John Fleming, Ploughland, Strathaven, "Clyde."	

Section 2. Long-Haired BITCH, not above 6 years old.

1. Colin D. Nairn, 16 Leith Street, Edinburgh, "Nell,"	2 0 0
2. James Sutor, The Collie, Fochabers, "Nell,"	1 0 0
C., John Sinclair, Kintessack, Forres, "Glen."	

Section 3. Short-Haired DOG, not above 6 years old.—No award.

Section 4. Short-Haired BITCH, not above 6 years old.—No award.

EXTRA.

Very Highly Commended.

Longhaired Dog, "Halla," winner of 1st Prize at Stirling, 1881, Colin D. Nairn, 16 Leith Street, Edinburgh, Minor Gold Medal,	3 15 0
	£9 15 0

Class VI.—POULTRY.

DORKING, Silver Grey. Cock—	
1. William Street, Stirling,	£1 0 0
2. Donald Cameron, Grougar, Kilmarnock,	0 10 0
DORKING, Silver Grey. Hen—	
1. John Cran, Keith,	1 0 0
2. James Ward, Keith,	0 10 0
DORKING, Silver Grey. Cockerel—	
1. James Robertson, Gordon Castle, Fochabers,	1 0 0
2. J. E. B. Baillie of Dochfour, Inverness,	0 10 0
DORKING, Silver Grey. Pullet—	
1. James Robertson, Gordon Castle, Fochabers,	1 0 0
2. John Cran, Keith,	0 10 0
DORKING, Coloured. Cock—	
1. John Cran, Keith,	1 0 0
2 Mrs Sutor, The Collie, Fochabers,	0 10 0
DORKING, Coloured. Hen—	
1. James Fletcher of Rosehaugh, Avoch,	1 0 0
2. James Fletcher of Rosehaugh, Avoch,	0 10 0
DORKING, Coloured. Cockerel—	
1. John Cran, Keith,	1 0 0
DORKING, Coloured. Pullet—	
1. William Adam, Tynet Gate, Fochabers,	1 0 0
2. William Adam, Tynet Gate, Fochabers,	0 10 0
COCHIN-CHINA. Cock—	
1. John Cran, Keith,	1 0 0
2. Captain Forsyth Grant of Ecclesgreig, Montrose,	0 10 0
COCHIN-CHINA. Hen—	
1. Captain Forsyth Grant of Ecclesgreig, Montrose,	1 0 0
2. William Street, Stirling,	0 10 0
COCHIN-CHINA. Cockerel.—	
1. Charles Sidgwick, Ryddlesden Hall, Keighley,	1 0 0
2. John Cran, Keith,	0 10 0
COCHIN-CHINA. Pullet—	
1. John Cran, Keith,	1 0 0
2. Charles Sidgwick, Ryddleston Hall, Keighley,	0 10 0
Carry forward,	£17 10 0

	Brought forward,	£17 10 0
BRAHMAPOOTRA. Cock—		
1. Mrs Sutor, The Collie, Fochabers,		1 0 0
2 T. R. Biscoe of Newton, Inverness,		0 10 0
BRAHMAPOOTRA. Hen—		
1. No award.		
2. Mrs Sutor, The Collie, Fochabers,		0 10 0
BRAHMAPOOTRA. Cockerel—		
1. Charles Sidgwick, Ryddlesden Hall, Keighley,		1 0 0
2. William Nicoll, 150 Scouringburn, Dundee,		0 10 0
BRAHMAPOOTRA. Pullet—		
1. Charles Sidgwick, Ryddlesden Hall, Keighley,		1 0 0
2. Jonathan Watson, Asby-Frizington, Carnforth,		0 10 0
SPANISH. Cock—		
1. William Street, Stirling,		1 0 0
2. William Street, Stirling,		0 10 0
SPANISH. Hen—		
1. William Street, Stirling,		1 0 0
2. James Norval, Hawkhill, Alloa,		0 10 0
SPANISH. Cockerel—		
1. Thomas Martin, Muiryhill, Thornhill,		1 0 0
2. James Norval, Hawkhill, Alloa,		0 10 0
SPANISH. Pullet—		
1. Mrs D. Mackenzie, Post-office, Meigle,		1 0 0
2. Thomas Martin, Muiryhill, Thornhill,		0 10 0
SCOTCH GREY. Cock—		
1. William G. M'Dougall, George Street, Stirling,		1 0 0
2. C. L. Ralston, Glamis House, Glamis,		0 10 0
SCOTCH GREY. Hen—		
1. William G. M'Dougall, George Street, Stirling,		1 0 0
2. John Cran, Keith,		0 10 0
SCOTCH GREY. Cockerel—		
1. Thomas Hamilton, Braidwood Tile Works, Carluke,		1 0 0
2. Thomas Clarkson, Braidwood Tile Works, Carluke,		0 10 0
SCOTCH GREY. Pullet—		
1. Thomas Clarkson, Braidwood Tile Works, Carluke,		1 0 0
2. William G. M'Dougall, George Street, Stirling,		0 10 0
HAMBURG. Cock—		
1. Major-General Duncan Baillie, Lochloy, Nairn,		1 0 0
2. Mrs Asher, Fettes House, Muir of Ord,		0 10 0
HAMBURG. Hen—		
1. No award.		
2. Major-General Duncan Baillie, Lochloy, Nairn,		0 10 0
HAMBURG. Cockerel—		
1. John Anderson, 241 High Street, Elgin,		1 0 0
2. John Morrison, Mill Street, Alloa,		0 10 0
HAMBURG. Pullet—		
1. Major-General Duncan Baillie, Lochloy, Nairn,		1 0 0
2. John Anderson, 241 High Street, Elgin,		0 10 0
POULTRY—Any other Pure Breed. Cock—		
1. John Cran, Keith (Langshan),		1 0 0
2. James Fletcher of Rosehaugh, Avoch (Polish),		0 10 0
POULTRY—Any other Pure Breed. Hen—		
1. John Cran, Keith (Langshan),		1 0 0
2. Robert E. Frew, Kirkcaldy (Polish),		0 10 0
	Carry forward,	£42 10 0

Brought forward,	£42	10 0
POULTRY—Any other Pure Breed. Cockerel—		
1. No award.		
2. The Earl of Mansfield, K.T., Scone Palace, Perth (White Dorking),	0	10 0
POULTRY—Any other Pure Breed. Pullet—		
1. The Earl of Mansfield, K.T., Scone Palace, Perth (White Dorking),	1	0 0
2. The Earl of Mansfield, K.T., Scone Palace, Perth (White Dorking),	0	10 0
GAME—Black or Brown Reds. Cock—		
1. George Cruickshank, Whitetree, Elgin,	1	0 0
2. Mrs Asher, Fettes House, Muir of Ord,	0	10 0
GAME—Black or Brown Reds. Hen—		
1. Mrs Sutor, The Collie, Fochabers,	1	0 0
2. George J. Ross, The Park, Dingwall,	0	10 0
GAME —Black or Brown Reds. Cockerel—		
1. James Graham, 3 Castle Wynd, Inverness,	1	0 0
2. George J. Ross, The Park, Dingwall,	0	10 0
GAME—Black or Brown Reds. Pullet—		
1. James Graham, 3 Castle Wynd, Inverness,	1	0 0
2. Mrs Sutor, The Collie, Fochabers,	0	10 0
GAME—Any other Pure Breed. Cock.—No Entry.		
GAME—Any other Pure Breed. Hen.—No Entry.		
GAME—Any other Pure Breed. Cockerel.—No Entry.		
GAME—Any other Pure Breed. Pullet.—No Entry.		
BANTAM—Any Pure Breed. Cock—		
1. Miss Agnes Meikle, Melrose (Game),	1	0 0
2. Miss Bessie P. Frew, Kirkcaldy (Game),	0	10 0
BANTAM—Any Pure Breed. Hen—		
1. Miss Rachel C. Frew, Kirkcaldy (Silver Laced),	1	0 0
2. The Hon. Marjory Murray, Scone Palace, Perth (Japanese),	0	10 0
BANTAM—Any Pure Breed. Cockerel—		
1. Miss Jane M. Frew, Kirkcaldy (Game),	1	0 0
2. John Cran, Keith (Game),	0	10 0
BANTAM—Any Pure Breed. Pullet—		
1. John Cran, Keith (Game),	1	0 0
2. George K. Scobie, Comely Park, Dunfermline,	0	10 0
DUCKS—White Aylesbury. Drake—		
1. Alex. Smith, Inchcorsie, Huntly,	1	0 0
2. Wm. Macbean, Cradle Hall, Inverness,	0	10 0
DUCKS—White Aylesbury. Duck—		
1. Alex. Smith, Inchcorsie, Huntly,	1	0 0
2. Mrs Sutor, The Collie, Fochabers,	0	10 0
DUCKS—White Aylesbury. Drake (Young)—		
1. Alex. Smith, Inchcorsie, Huntly,	1	0 0
2. Major-General Duncan Baillie, Lochloy, Nairn,	0	10 0
DUCKS—White Aylesbury. Duckling—		
1. Alex. Smith, Inchcorsie, Huntly,	1	0 0
2. Major-General Duncan Baillie, Lochloy, Nairn,	0	10 0
DUCKS—Rouen. Drake—		
1. R. G. Smith, Georgeville, Midcalder,	1	0 0
2. James Ward, Keith,	0	10 0
DUCKS—Rouen. Duck—		
1. Admiral Maitland Dougall of Scotscraig, Tayport,	1	0 0
2. The Earl of Mansfield, K.T., Scone Palace, Perth,	0	10 0
Carry forward,	£65	10 0

Brought forward,	£65 10 0
DUCKS—Rouen. Drake (Young)—	
1. Admiral Maitland Dougall of Scotscraig, Tayport,	1 0 0
2. James Ward, Keith,	0 10 0
DUCKS—Rouen. Duckling—	
1. James Ward, Keith,	1 0 0
2. Admiral Maitland Dougall of Scotscraig, Tayport,	0 10 0
DUCKS—Any other Pure Breed. Drake—	
1. Thomas Martin, Muiryhill, Thornhill (Pekin),	1 0 0
2. The Hon. Marjory Murray, Scone Palace, Perth (Muscovey),	0 10 0
DUCKS—Any other Pure Breed. Duck—	
1. Thomas Martin, Muiryhill, Thornhill (Pekin),	1 0 0
2. James Fletcher of Rosehaugh, Avoch (Pekin),	0 10 0
DUCKS- Any other Pure Breed. Drake (Young)—	
1. John Cran, Keith (Pekin),	1 0 0
DUCKS—Any other Pure Breed. Duckling—	
1. John Cran, Keith (Pekin),	1 0 0
TURKEYS—Any Pure Breed. Cock—	
1. T. R. Biscoe of Newton, Inverness (Bronze),	1 0 0
2. The Earl of Mansfield, K.T., Scone Palace, Perth (Black Norfolk),	0 10 0
TURKEYS—Any Pure Breed. Hen—	
1. Alexander Munro, Oakes Villa, Invergordon (Cambridge),	1 0 0
2. James Mollison, Dochgarroch Lodge, Inverness (Black Norfolk),	0 10 0
TURKEYS—Any Pure Breed. Cock (Poult)—	
1. John Cran, Keith (Cambridge),	1 0 0
2. Mrs Sutor, The Collie, Fochabers (Norfolk),	0 10 0
TURKEYS—Any Pure Breed. Hen (Poult)—	
1. John Cran, Keith (Cambridge),	1 0 0
2. James E. B. Baillie of Dochfour, Inverness (Black Norfolk),	0 10 0
GEESE—Any Pure Breed. Gander—	
1. William M'Bean, Cradle Hall, Inverness (Toulouse),	1 0 0
2. Captain F. Grant, Ecclesgreig, Montrose (Toulouse),	0 10 0
GEESE—Any Pure Breed. Goose—	
1. William M'Bean, Cradle Hall, Inverness (Toulouse),	1 0 0
2. Captain F. Grant, Ecclesgreig, Montrose (Toulouse),	0 10 0
GEESE—Any Pure Breed. Gander (Young)—	
1. The Earl of Mansfield, K.T., Scone Palace, Perth (Toulouse),	1 0 0
2. Alex. Smith, Inchcorsie, Huntly (Toulouse),	0 10 0
GEESE—Any Pure Breed. Gosling—	
1. Alex. Smith, Inchcorsie, Huntly (Toulouse),	1 0 0
2. Geo. Cruickshank, Whitetree, Elgin (Toulouse),	0 10 0
	£85 10 0

CLASS VII.—HIGHLAND INDUSTRIES AND FISHERIES.

John Gunn, Golspie, Guard Rail for Fishing Boats, £8, and Medium Gold Medal,	£14 2 0

CLASS VIII.—BEE HUSBANDRY.

Jas. Johnstone, Touch, Stirling—Observatory Hive, Silver Medal,	£0 16 0
Jas. Johnstone, Touch, Stirling—Bee Driving, Silver Medal,	0 16 0
	£1 12 0

ABSTRACT OF PREMIUMS.

Cattle,	£769 14 8
Horses,	477 10 0
Sheep,	263 0 0
Swine,	41 12 0
Collie Dogs,	9 15 0
Poultry,	85 10 0
Highland Industries and Fisheries,	14 2 0
Bee Husbandry,	1 12 0
	£1662 15 8

JUDGES.

SHORTHORN.—James Cochrane, Waterside Lodge, Newburgh, Aberdeen; John Wood, 8 The Crescent, Ripon.

AYRSHIRE.—Andrew Allan, Munnoch, Dalry, Ayr.

POLLED ANGUS OR ABERDEEN.—James Macdonald, Editor, *Irish Farmers' Gazette*, Dublin; William Robertson, Aberlour Mains, Craigellachie.

GALLOWAY.—James Cunninghame, Tarbreoch, Dalbeattie.

HIGHLAND.—D. A. M'Diarmid, Killiemore, Auchnacraig, Mull; James M'Pherson, Maam, Inveraray; John Maclachlan, Frenich, Pitlochry.

FAT STOCK AND SWINE.—Matthew Elliot, Inverness; George Williamson, Shempston, Elgin.

DRAUGHT STALLIONS AND ENTIRE COLTS.—James Calder, Colgrain, Cardross; James Lockhart, Mains of Airies, Stranraer; David M'Gibbon, Ard-Na-Craig, Campbeltown.

DRAUGHT MARES, FILLIES, AND GELDINGS.—Robert Brydon, The Dene, Seaham Harbour; Robert Murdoch, West Hallside, Newton, Lanarkshire; James Torrance, Milton, Lesmahagow.

ROADSTERS AND PONIES.—Robert O. Farquharson of Haughton, Alford; William Ford, Fenton Barns, Drem; Colonel Gillon of Wallhouse, Bathgate.

BLACKFACED —George Malcolm, Invergarry; James Moffat, jun., Gateside, Sanquhar.

CHEVIOT.—Thomas Elliot, Blackhaugh, Galashiels; Peter Robertson, Achilty, Dingwall.

BORDER LEICESTER AND OTHER LONG-WOOLLED.—Richard H. Harris, Earnhill, Forres; John Usher, Stodrig, Kelso.

SHROPSHIRE AND OTHER SHORT-WOOLLED.—John R. Evans, Uffington, Shrewsbury.

SWINE.—The Judges of Fat Stock.

COLLIE DOGS.—James Moffat, jun., Gateside, Sanquhar.

POULTRY.—Thomas Raines, Bridge Haugh, Stirling.

ATTENDING MEMBERS.

SHORTHORN.—Allan R. Mackenzie, yr. of Kintail; William Brown, Earlsmill.

AYRSHIRE.—George Inglis of Newmore; James Mollison, jun., Glenelg.

POLLED ANGUS OR ABERDEEN.—Colonel Davidson of Tulloch; Duncan Cameron, Fettes.

GALLOWAY.—Captain Fraser of Balnain; C. M. Cameron, Balnakyle.

HIGHLAND.—D. M. Ross, yr. of Cromarty; Captain Mackessack, yr. of Ardgye.

FAT STOCK AND SWINE.—Colonel Clarke of Achareidh; C. L. Mackenzie, Braclangwell.

DRAUGHT STALLIONS AND ENTIRE COLTS.—T. R. Biscoe of Newton; Donald Paterson, Balrobert.

DRAUGHT MARES, FILLIES, AND GELDINGS.—Brodie of Brodie; Major Warrand, Ryefield House.

ROADSTERS AND PONIES.—Mackintosh of Mackintosh; John Smith, Inverallan.

BLACKFACED.—Captain Munro of Fowlis; E. C. Sutherland-Walker of Skibo,

CHEVIOT.—Robert Anderson of Lochdhu; James Mollison, Dochgarroch Lodge.

BORDER LEICESTER AND OTHER LONG-WOOLLED.—Alexander Henderson of Stemster; John Peter, Croyard.

SHROPSHIRE AND OTHER SHORT-WOOLLED.—Major Grant, Drumbuie; William Mackay, Melness.

COLLIE DOGS.—Captain Dunbar Brander of Pitgavenie; A. C. Hebden, Nairn.

POULTRY.—G. Duff Dunbar of Hempriggs; G. G. Clarke, Eriboll.

IV.—DISTRICT COMPETITIONS.

CATTLE.

NAME OF DIST.	PREMIUM AWARDED TO	FOR	AMOUNT.
Deeside Union	Gordon Watt, Mains of Park	Shorthorn Heifer	£3 0 0
	Gordon Watt, Mains of Park	do.	
	J. & A. Dewar, Bethlin	do.	1 0 0
Lorn	Finlay M'Lachlan, Clachdon	Highland Bull Class I. *	3 0 0
	John M'Intyre, Barcaldine	do. do.	2 0 0
	James M'Kechnie, Blarcreen	do. do.	1 0 0
	Duncan M'Callum, Clenmackrie	do. Class II. †	3 0 0
	John Campbell, Glenoe,	do. do.	2 0 0
	John M'Intyre, Barcaldine	do. do.	1 0 0
	John M'Intyre, Barcaldine	Highland Heifer	3 0 0
	Alex. M'Leish, Ardmaddy	do.	2 0 0
	Duncan M'Callum, Clenmackrie	do.	1 0 0
Central Banffshire	James M'William, Stoneytown	Shorthorn Bull Class II. Minor Sil. Medal	
	T. F. Inkson, Kinermony	Polled Heifer Minor Silver Medal	
Stirlingshire	John Young, Cobblebrae	Ayrshire Bull Class I. Minor Silver Medal	
	William Weir, Inches	do. Class II. do.	
	W. C. Macfarlane, Greenhill	Shorthorn Heifer do.	
Mull, Coll, and Tiree	J. N. Forsyth of Quinish	Highland Bull Class I. Minor Silver Medal	
	Peter Robertson, Rahoy	do. Class II. do.	
	John M'Phail, Scalastle	Highland Heifer do.	
Renfrewshire	W. Bartlemore, Netherhouses	Ayrshire Bull Silver Medal	
	Andrew Hoggan, jun., Busby	Ayrshire Bull Class I. Minor Silver Medal	
	Andrew Hoggan, jun., Busby	do. Class II. do.	
	Andrew Hoggan, jun., Busby	Ayrshire Heifer do.	
Buchan	N. Lawrence, Bridgend	Shorthorn Bull Class I. Minor Sil. Medal	
	Lt.-Col. Ferguson, Pitfour	Polled Bull Class II. Minor Silver Medal	
	Lt.-Col. Ferguson, Pitfour	Polled Heifer Minor Silver Medal	

HORSES FOR AGRICULTURAL PURPOSES.

Lower Ward of Renfrewshire	David Riddell, Blackhall	Stallion	25 0 0
Vale of Alford	William Wyllie	Stallion	25 0 0
Lower Annandale	Peter Ferguson, Renfrew	Stallion	25 0 0
Kirriemuir	William Stevenson, Lochgrog	Stallion	15 0 0
Dunblane, Doune, and Callander	James M'Nab, Glenochil	Stallion	15 0 0
Cupar and St Andrews	A. W. Russell of Kenlygreen	Brood Mare	4 0 0
	William Dingwall, Ramornie	do.	3 0 0
		Carry forward,	£136 0 0

* Aged Bulls. † Two-year old Bulls.

NAME OF DIST.	PREMIUM AWARDED TO	FOR	AMOUNT.
		Brought forward,	£136 0 0
Nairnshire	James M'Kessack, Earnside	Brood Mare	4 0 0
	James M'Kessack, Earnside	do	3 0 0
Earl of Selkirk's Tenantry and District	William Montgomery, Banks	Brood Mare	4 0 0
	Thomas Phillips, Carse	do.	3 0 0
Central Strathearn	Robert Gardiner, Chapel Bank	Brood Mare	4 0 0
	James Calder, Ardargie	do.	3 0 0
Eskdale and Liddesdale	John Richardson, Purdomston	Brood Mare	4 0 0
	David Hardie, Priesthaugh	do.	3 0 0
Morayshire	James Watt, Mains of Mulben	Brood Mare	4 0 0
	James M'Kessack, Earnside	do.	3 0 0
Eastern District of Berwickshire	Gavin Jack, Foulden Newton	One-year old Colt	2 0 0
	Gavin Jack, Foulden Newton	do.	1 0 0
	Henry H. Craw, West Mains	Two-year old Filly	1 0 0*
	Gavin Jack, Foulden Newton	do.	0 10 0*
	E. White, Aytonlaw	do.	0 5 0*
	Alex. W. White, Kelloe Mains	One-year old Filly	2 0 0
	Henry H. Craw, West Mains	do.	1 0 0
	James Cousin, Blackburn	do.	0 10 0
Lauderdale	James Dunn, Blainslie	Brood Mare	2 0 0
	John Bertram, Hartside	do.	1 0 0
	Thomas Neilans, New Mills	Three-year old Filly	2 0 0
	Jas. W. Lawrie, Mitchelston	do.	1 0 0
	John Mark, Craigend	Two-year old Filly	2 0 0
	John Mark, Craigend	do.	1 0 0
	Robert S Bruce, Thirlstane	do.	0 10 0
	Robert S. Bruce, Thirlstane	One-year old Filly	1 0 0*
	Robert S. Bruce, Thirlstane	do.	0 10 0*
	Jas. W. Lawrie, Mitchelston	do.	0 5 0*
Machars	Matthew Kerr, Craiglemine	Two-year old Colt	1 0 0*
	Routledge Bros., Old Mills	do.	0 10 0*
	John Forsyth, Rifferpark	One-year old Colt	2 0 0
	William Mactier, Garchew	do.	1 0 0
	James M'Connell, Boreland	Two-year old Filly	2 0 0
	James Jardine, Blairshinnoch	do.	1 0 0
	A. M'Whinnie, Aireyolland	do.	0 10 0
	Robt. M'Dowall, Auchengallie	One-year old Filly	2 0 0
	Robt. M'Dowall, Auchengallie	do.	1 0 0
	C. Anderson, Barsalloch	do.	0 10 0
County of Peebles	David Alston, Hyndford	Two-year old Entire Colt	1 0 0*
	David Alston, Hyndford	do.	0 10 0*
	Lord Arthur Cecil, Orchard Mains	Two-year old Filly	2 0 0
	P. Melrose, West Loch	do.	1 0 0
	William Dickson, Traquair	do.	0 10 0
	Lord Arthur Cecil, Orchard Mains	One-year old Filly	2 0 0
	David Alston, Hyndford	do.	1 0 0
	William French, Muirlea	do.	0 10 0
		Carry forward,	£210 10 0

* Half Premiums awarded, the number of Lots being under five.

NAME OF DIST.	PREMIUM AWARDED TO	FOR	AMOUNT.
		Brought forward,	£210 10 0
Eastern District of Stirlingshire	Robert Calder, Mumrills	Two-year old Colt	2 0 0
	George Waddell, Bonnyfield	do.	1 0 0
	James Fleming, Carmuirs	One-year old Colt	2 0 0
	John Rennie, Craigburn	do.	1 0 0
	Thomas Chalmers, Walton	Two-year old Filly	2 0 0
	George Waddell, Bonnyfield	do.	1 0 0
	John Stevenson, Cowden Hill	do.	0 10 0
	Robert Calder, Mumrills	One-year old Filly	2 0 0
	Robert Meikle, Polmont Hill	do.	1 0 0
	Carron Co., Roughlands	do.	0 10 0
Lesmahagow	John M'Millan, Bent	One-year old Colt	2 0 0
	Gavin Hamilton, Auldtown	do.	1 0 0
	Thomas Hamilton, Poniel	Two-year old Filly	2 0 0
	John Steele, Boreland	do.	1 0 0
	Thomas Mitchell, Nethanfoot	do.	0 10 0
	James Vallance, Greathill	One-year old Filly	2 0 0
	Gavin Hamilton, Auldtown	do.	1 0 0
	Andrew Torrance, Kypeside	do.	0 10 0
Carrick	Thomas Crawford, Drumbeg	One-year old Colt	1 0 0*
	Robert Harper, Myremill	do.	0 10 0*
	Thomas Crawford, Drumbeg	Two-year old Filly	2 0 0
	Quintin Dunlop, Morriston	do.	1 0 0
	William Henderson, Meadownay	do.	0 10 0
	David Cross of Knockdon	One-year old Filly	2 0 0
	Thomas Crawford, Drumbeg	do.	1 0 0
	James Wright, Doonside	do.	0 10 0
		SHEEP.	
Border Union	John Robson, Newton	Cheviot Tup	1 0 0*
	John Robson, Newton	do.	0 10 0*
	Thomas Clark, Oldhamstocks	Border Leicester S. Tup	2 0 0
	Samuel Jack, Mersington	do.	1 0 0
	Thomas Clark, Oldhamstocks	Border Leicester Gmrs.	2 0 0
	George Simson, Courthill	do.	1 0 0
Athole and Weem	P. & D. Ferguson, Dalcapon	Leicester Shear. Tup	1 0 0*
	P. & D. Ferguson, Dalcapon	do.	0 10 0*
	Adam Conacher, Ballyoukan	Leicester Gimmers	1 0 0*
	P. & D. Ferguson, Dalcapon	do.	0 10 0*
United East Lothian	A. J. Balfour of Whittinghame, M.P.	Leicester Tup	1 0 0*
	Adam Smith, Stevenson Mains	do.	0 10 0*
	Andrew Smith, Castle Mains	Leicester Shear. Tup	2 0 0
	A. J. Balfour of Whittinghame, M.P.	do.	1 0 0
Nether Lorn	Robert Allan, Glenmore	Blackfaced Tup	2 0 0
	Robert Allan, Glenmore	do.	1 0 0
	Allan Hall, Degnish	Blackfaced Shear. Tup	2 0 0
	Robert Allan, Glenmore	do.	1 0 0
	Robert Allan, Glenmore	Blackfaced Ewes	2 0 0
	Allan Hall, Degnish	do.	1 0 0
	Robert Allan, Glenmore	Blackfaced Gimmers	2 0 0
	Robert Allan, Glenmore	do.	1 0 0
Argyll	A. Sinclair, Upper Largie	Blackfaced Tup	2 0 0
	R. Allan, Glenmore	do.	1 0 0
	A. Campbell of Auchindarroch	Blackfaced Shear. Tup	2 0 0
	A. Campbell of Auchindarroch	do.	1 0 0
		Carry forward	£275 0 0

* Half Premiums awarded, the number of Lots being under five.

NAME OF DIST.	PREMIUM AWARDED TO	FOR	AMOUNT.
		Brought forward,	£275 0 0
	John Malcolm of Poltalloch	Blackfaced Ewes	2 0 0
	R. Allan, Glenmore	do.	1 0 0
	John Malcolm of Poltalloch	Blackfaced Gimmers	2 0 0
	Sir J. P. C. Orde of Kilmory, Bart.	do.	1 0 0
Inveraray	James M'Pherson, Maam	Blackfaced Tup	2 0 0
	James M'Pherson, Maam	do.	1 0 0
	James M'Pherson, Maam	Blackfaced Shear. Tup	2 0 0
	James M'Pherson, Maam	do.	1 0 0
	James M'Pherson, Maam	Blackfaced Ewes	2 0 0
	Robt. M'Taggart, Achadunan	do.	1 0 0
	James M'Pherson, Maam	Blackfaced Gimmers	2 0 0
	James M'Pherson, Maam	do.	1 0 0
Dunoon	James Duncan of Benmore	Blackfaced Tup	Minor Silver Medal
	James Duncan of Benmore	Blackfaced Shear. Tup	Minor Silver Medal
	James Duncan of Benmore	Blackfaced Ewes	Minor Silver Medal
	James Duncan of Benmore	Blackfaced Gimmers	Minor Silver Medal
Dalkeith	Duke of Buccleuch	Leicester Tup	Minor Silver Medal
	Duke of Buccleuch	Leicester Shear. Tup	Minor Silver Medal
	Duke of Buccleuch	Leicester Ewes	Minor Silver Medal
	Duke of Buccleuch	Leicester Gimmers,	Minor Silver Medal
Upper Ward of Lanarkshire	Alex. Hamilton, Yardhouse	Blackfaced Tup	Minor Silver Medal
	James Greenshields, West Town	Blackfaced Shear. Tup	Minor Silver Medal
	Mrs Tweedie, Castle Crawford	Blackfaced Ewes	Minor Silver Medal
	Ebenezer Ritchie, Stonehill	Blackfaced Gimmers	Minor Silver Medal
Lochaber	G. W. Anderson of Ardsheal	Blackfaced Tup	Minor Silver Medal
	D. P. M'Donald, Claggan	Blackfaced Shear. Tup	Minor Silver Medal
	D. P. M'Donald, Claggan	Blackfaced Ewes	Minor Silver Medal
	D. P. M'Donald, Claggan	Blackfaced Gimmers	Minor Silver Medal
County of Forfar	Earl of Dalhousie	Leicester Tup	Minor Silver Medal
	Earl of Dalhousie	Leicester Shear. Tup	Minor Silver Medal
	Earl of Dalhousie	Leicester Ewes	Minor Silver Medal
	Earl of Dalhousie	Leicester Gimmers	Minor Silver Medal
County of Caithness	William Purves, Thurdistoft	Leicester Shear. Tup	Minor Silver Medal

DAIRY PRODUCE.

Forth Society.	William Scott, Crofthead	Sweet Milk Cheese	1 0 0*
	Jas. Anderson, West Forth	Sweet Milk Cheese	0 10 0*
	John Thom, Damhead	Cured Butter	2 0 0
	James Black, Bowridge	Cured Butter	1 0 0
			£297 10 0
	1 Common Silver Medal,		0 16 0
	35 Minor Silver Medals,		9 0 10
			£307 6 10

SPECIAL GRANTS.

NAME OF DIST.		AMOUNT.
Ayrshire Association	Vote to Dairy Produce Show at Kilmarnock,	£20 0 0
Unst Agricultural Society	Vote in aid of Premiums,	3 0 0
Orkney Agricultural Society	Vote in aid of Premiums,	3 0 0
Rousay Agricultural Society	Vote in aid of Premiums,	3 0 0
		£29 0 0

* Half Premiums awarded, the number of Lots being under eight.

MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

Minor Silver Medals were awarded to the following:—

ABERDEENSHIRE.

NAME OF DISTRICT.	MEDAL AWARDED TO	FOR
Auchindoir, Kildrummie, and Towie	H. G. Lumsden, Clova	Polled Bull
	John Forbes, Mains of Brux	Polled Cow
	John Forbes, Mains of Brux	Polled Heifer
	James Walker, Westside of Brux	Polled Heifer
Cluny, Monymusk, and Midmar	Alexander Dewar, Bethlen	Shorthorn Bull
	George Stewart, Auchravie	Leicester Ewes
Cromar, Upper Dee, and Donside	Her Majesty the Queen	Polled Bull
	Robert Anderson, Daugh	Polled Cow
	Robert Dingwall, Blackmill	Shorthorn Bull
	Charles Strachan, Tillyorn	Shorthorn Cow
Ebrieside	William Leask, Skilmafilly	Shorthorn Bull
	John Littlejohn, Ebriehead	Polled Bull
	George Johnston, Overtown	Draught Mare
	Robert Kilgour, Ardlin	Leicester Tup
	Mrs Catto, Braehead	Cured Butter
Formartine	David Gibson, Pitmedden	Swedes
	David Gibson, Pitmedden	Potatoes
Fyvie	James Durno, Jackstown	Shorthorn Heifer
	George Cocker, Hill of Petty	Draught Mare
Garioch	Henry Gordon of Manar	Swedish Turnips
	John Maitland, East Balhalgardy	Yellow Turnips
Kinellar	James Mitchell, Caiesmill	Pen of Poultry
Kinnethmont	Col. Leith Hay of Leith-hall	Shorthorn Bull
	James Moir, Mains of Wardhouse	Shorthorn Cow
	John Stewart, Auchindellan	Polled Bull
	Peter Bruce, Myreton	Draught Mare
	Mrs Leith Hay, Leith-hall	Cured Butter
Leochel Cushnie	Alexander Strachan, Wester Fowlis	Polled Bull
	Alexander Strachan, Wester Fowlis	Polled Heifer
	Alexander Strachan, Wester Fowlis	Green Crop
Mar	George Reid, Baads	Polled Heifer
	Silvester Campbell, Kinnellar	Shorthorn Cow
North-East Aberdeenshire	James Birnie, Overtown	Shorthorn Bull
	James Beedie, Ardlaw Mains	Polled Cow
	George Chessor, Percyhorner	Draught Mare
	John King, Blackslack	Seeds
	William Penny, Tyronhill	Roots
	Mrs Stewart, Sandhole	Dairy Produce
North of Scotland	James Murray, Fauchfaulds	Turnips
	William Ironside, Mains of Keith	Potatoes
Strichen	Alexander Urquhart, Auchtygills	Shorthorn Bull
	Alexander Beddie, Banks	Polled Cow

ARGYLLSHIRE.

Kintyre	Peter Clark, Pininver	Ayrshire Bull
	John Gemmell, Dalrioch	Ayrshire Cow
	David M'Gibbon, Ard-na-Craig	Clydesdale Filly
	Duke of Argyll, K.G.	Blackfaced Tup
Lismore	Alexander M'Coll, Park	Highland Bull
	Dugald M'Dougall, Baileveolan	Brood Mare
Mull, Coll, and Tiree	H. H. Pitcairn, Tiroran	Highland Heifer
	John Galbraith, Ardnacross	Draught Mare
	H. A. Campbell, Ardfenaig	Blackfaced Shearling Tup
	Walter Elliot, Laggan	Cheviot Shearling Tup

AYRSHIRE.

Beith	David Kerr, Parkfarm	Ayrshire Bull
	John Parker, Roughwood	Ayrshire Cow
Coylton and Stair	Robert Caldwell, Knockshoggle	Ayrshire Cow
	John Sloan, Barnhill	Clydesdale Mare
Dalry	Andrew Craig, Kirkland	Ayrshire Bull
	Gilbert Ferguson, Thirdpart	Ayrshire Cow
	William Crawford, Bowertrapping	Brood Mare
	Andrew Craig, Cunningham-Baidland	Ayrshire Cow

AYRSHIRE—*continued.*

NAME OF DISTRICT.	MEDAL AWARDED TO	FOR
Galston	James Young, Sornhill	Roots
	Hugh Fleming, Lochfield	Sweet Milk Cheese
	Alexander Meikle, Strath	Powdered Butter
Kilmarnock	David Riddell, Blackhall	Clydesdale Stallion
	Lawrence Drew, Merryton	Clydesdale Mare
Loudoun & Lanfine	Hugh Fleming, Lochfield	Sweet Milk Cheese
	James Hendrie, Drumdroch	Ayrshire Bull
	Alexander Steel, Burnhead	Ayrshire Cow
	A. W. Taylor, Bellisle	Clydesdale Mare
	James Mitchell, Cairnhill	Border Leicester Tup
Muirkirk	Hugh Anderson, Greenock Dyke	Ayrshire Bull
	Daniel Craig, Netherwood	Ayrshire Cow
	Thomas M. M'Minn, Upper Wellwood	Clydesdale Gelding
	Andrew Hamilton, Greenock Mains	Clydesdale Mare
	James Craig, Middlefield	Blackfaced Tup
	John Colville, Auldhouseburn	Blackfaced Tup
New Cumnock	R. & P. Wardrop, Garlaff	Ayrshire Bull
	William Steel, Fardenrioch	Ayrshire Cow
Sorn and Dalgain	John Retson, Holehousehillhead	Ayrshire Bull
	John Cameron, Waulkmill	Ayrshire Cow
	John Watson, Daldorch	Clydesdale Mare
	William Sloan, Crofthead	Sweet Milk Cheese
	John Watson, Daldorch	Fences
West Kilbride	Archibald Wilson, Drummelling	Ayrshire Bull
	John Hendry, Mains	Ayrshire Cow
	James Dunlop, Hunterston	Draught Mare
	John Montgomery, Meadowhead	Cheddar Cheese
	Miss G. Crawfurd of Auchenames	Cured Butter
	BERWICKSHIRE.	
East of Berwickshire	R., G., & W. B. Swan, Berryhaughs	Cross Cow
	Robert Fender, Northfield	Leicester Sheep
	Gavin Jack, Foulden Newton	Brood Mare
	DUMBARTONSHIRE.	
Kirkintilloch	George Hamilton, Hayston	Ayrshire Cow
	Walter Lyon, Balquharrage	Ayrshire Cow
	George Graham, Easterboards	Clydesdale Colt
	John Wallace, Stoneclaw	Clydesdale Gelding
Western District of Dumbartonshire	Mrs MacLellan, High Balernick	Ayrshire Bull
	Duncan M'Farlane, Torr	Ayrshire Cow
	DUMFRIESSHIRE.	
Moffat and Upper Annandale	William Dunn, Granton	Ayrshire Cow
	James Johnstone, Hunterheck	Clydesdale Mare
	John A. Johnstone, Archbank	Cheviot Tup
	George Kerr, Craigielands Lodge	Dorkings
	ELGINSHIRE.	
Forres and Northern Fat Show Club	James Bruce, Burnside	Cross Ox
	John Cran, Bunchrew	Cross Heifer
	Duke of Richmond and Gordon, K.G.	Blackfaced Wethers
	Duke of Richmond and Gordon, K.G.	Pig
	Richard H. Harris, Earnhill	Turnips
	George Morrison, Grange Mills	Grain
	FIFESHIRE.	
Windy-gates	John Balfour of Balbirnie	Draught Mare
	John Balfour of Balbirnie	Leicester Tup
	INVERNESS-SHIRE.	
Strathspey	John Grant, Advie Mains	Polled Bull
	John Grant, Advie Mains	Polled Heifer
	John Grant, Clunas Mains	Clydesdale Mare
	John Grant, Advie Mains	Common Barley
	John Grant, Bogg	Collection of Roots

LANARKSHIRE.

NAME OF DISTRICT.	MEDAL AWARDED TO	FOR
Calderwaterhead	James Williamson, Greenhead	Ayrshire Cow
	William Murray, Hills of Murdostoun	Clydesdale Colt
Carmunnock	Andrew Hoggan, jun., Busby	Ayrshire Cow
	William Fleming, Windlaw	Draught Gelding
Old Monkland	John Steel, Lochwood	Ayrshire Cow

PERTHSHIRE.

Culross	William Graham, Carneil	Hay
	William Beveridge, East Grange	Farm Management
	William Beveridge, East Grange	Turnips
Moulin	John Stewart, Edradour	Green Crop
Stormont Union	James Ferguson, Ballunie	Polled Cow
	D. L. Grigor, Banchory	Clydesdale Mare
	Alexander Farquharson, Greenburns	Shropshire Tup
	James Sidy, Bridge Farm	Turnips
	Mrs Sidy, Banchory	Dairy Produce

RENFREWSHIRE.

Johnstone	Arthur Lang, West Kilbride	Ayrshire Cow
	William Bowie, Blackbyre	Draught Gelding
Lochwinnoch	David Kerr, Park Farm	Ayrshire Bull
	David Kerr, Park Farm	Ayrshire Cow

ROSS-SHIRE.

Black Isle	A. Cameron, Killen	Shorthorn Bull
	D. M. Ross, yr. of Cromarty	Clydesdale Mare
	D. Cameron, Fettes	Leicester Tup
	A. Mitchell, Drumderfit	Barley
	C. Munro, Weston	Oats
	James Fletcher of Rosehaugh	Ryegrass Seed

STIRLINGSHIRE.

Campsie, Strathblane, and Baldernock	John M'Kean, Ballewan	Ayrshire Bull
	Walter Lyon, Balquharrage	Clydesdale Mare
Kilsyth	James Graham, Auchencloch	Ayrshire Cow
	James Patrick, Queenzieburn	Clydesdale Mare

140 Minor Silver Medals, £36, 3*s*. 4*d*.

PLOUGHING COMPETITIONS.

In 1882–83 the Society's Silver Medal was awarded at 155 Ploughing Competitions as follows:—

ABERDEENSHIRE.

NO.	NAME OF SOCIETY.	PLACE OF COMPETITION.	SILVER MEDAL AWARDED TO
1.	Aboyne.	Haugh.	John Skeene, Mill of Gellan.
2.	Ballater.	Braikley.	Alexander Ross, Ballater.
3.	Buchan.	Lumbs.	James Scott, Auchtygills.
4.	Cairnie.	Hollowdyke.	Peter Mitchell, Claypots.
5.	Corgarff.	Cockbridge.	James Coutts, Darlick.
6.	Countesswells.	North Lasts.	John Duguid, Wardhead.
7.	Crathie.	Invergelder.	John Mackie, Crathie Manse
8.	Cromar and Lochside.	Coutts Croft.	Gordon Smith, The Manse.
9.	Echt, Skene, &c.	Tillyboy.	A. Forbes, Garrick.
10.	Finzean.	Wester Clune.	A. Anderson, Balnaboth.
11.	Leochel-Cushnie.	Wester Leochel.	Francis Gilbert, Norham.
12	Lumphanan.	Tillylair.	F. Cromar, Auchinhove.
13.	Monymusk, &c.	Inn Farm.	James Duthie, Gight.
14.	Newhills and Dyce.	Overhills.	John Henderson, Derbeth.
15.	North-East Aberdeenshire.	Sandhole.	Wm. Webster, Mains of Forest.
16.	Strichen.	Smiddyhill.	Alex. Turiff, Strichen Mains.

NO.	NAME OF SOCIETY.	PLACE OF COMPETITION.	SILVER MEDAL AWARDED TO
		ARGYLLSHIRE.	
17.	Duror.	Kiel.	Donald Connell, Ard Sheal.
18.	Islay, Jura, and Colonsay.	Bridgend.	Donald Gillespie, Corsapool.
19.	Kintyre.	Cattadale.	Dun. M'Phie, Darlochan.
20.	Lismore.	Ballieveolan.	John M'Corquodale, Balure.
21.	Lorn.	Auchnacreebeg	Dun. Buchanan, Eriska.
22.	Strath of Appin.	Glasdrum.	John Boyd, Achnacone.
		AYRSHIRE.	
23.	Ayr and Alloway.	Broomberry.	Wm. Gray, Trees.
24.	Coylton.	Hole.	James Weir, High Park.
25.	Dalry.	Lintseedridge.	Robt. Fulton, Cuff.
26.	Dalrymple.	Balgreen.	William Brown, Balgreen.
27.	Fenwick.	Tannacrieff.	Hugh Meikle, Parkhead.
28.	Galston.	Bent.	Robt. Meikle, Strath.
29.	Glenmuir and Bellowaters.	Duncanziemuir.	Robt. Neil, Darmalloch.
30.	Kilmarnock.	South Dean.	Robt. Osborne, Drumjohn.
31.	Kirkmichael.	Cloncaird.	John M'Kie, Killockie.
32.	Minishant.	Midton.	James Paten, Grimmet,
33.	Monkton.	Brocket.	William Aitkinson, Newdykes.
34.	New Cumnock.	Castlemains.	Wm. Millar, Whitehill.
35.	Sorn.	Daldillan.	Geo. M'Kerrow, Daldillan,
36.	Stewarton.	Castleton.	M. Steel, jun., Auchenharvie.
37.	Tarbolton.	Bennals.	Thos. M'Kay, Springbank.
38.	West Kilbride.	West Kilbride.	And. Dinning, Ardneil,
		BANFFSHIRE.	
39.	Boharm.	Ardoch.	Jas. Neish, Gauldwell.
40.	Keith.	Durn.	A. Allan, Ardonald.
		BERWICKSHIRE.	
41.	Cockburnspath.	Redheugh.	John Anderson, Pathhead.
42.	Lammermoor.	Blakerston.	John Thomson, Burnhouses.
		BUTE AND ARRAN.	
43.	Arran.	Torlin.	Dan. M'Donald, West Bennan
44.	Bute.	Windyhall.	Hugh M'Lean, Ascog.
45	Bute (1881).	Ardnahoe.	Dun. Morrison, Kerrycroy.
		CLACKMANNANSHIRE.	
46.	Clackmannanshire	Bowhouse.	Peter Watson, Parkfarm.
		CROMARTYSHIRE.	
47	Cromarty.	Glen Urquhart.	Thos. M'Kenzie, Muirton.
		DUMBARTONSHIRE.	
48.	Kirkintilloch.	Dumbreck.	Matthew Barrie, Haystone.
		DUMFRIESSHIRE.	
49.	Glencairn.	Straith.	Arch. M'Kirdale, Gordieston.
50.	Holywood.	Broomrigg.	Robt. Johnstone, Summerhill.
51.	Kirkconnel.	Burnfoot.	Donald M'Callum, Kelloside.
52.	Lochmaben.	Bridgemuir.	Wm. Edgar, Halleaths.
53.	Penpont.	Cairn Mill.	John Bryce, Tibbers.
		EDINBURGHSHIRE.	
54.	Glencross.	Bush.	Thomas Paden, Easter Bush.
55.	Lasswade.	Pentland.	John White, Thornton.
56.	West Calder.	Turniemoon.	Wm. Greenhorn, East Breich.
		ELGINSHIRE.	
57.	St Andrews.	Wester Calcots.	Alex. Sandison, Lochhill.
58.	Spey, Avon, &c.	Ballindalloch.	James Neish, Gauldwell.
59.	Strathspey.	Delchapple.	Don. M'Queen, Bogg.
60	Urquhart.	Corskie.	A. Sandieson, Innesmill.
61.	Western District of Elgin.	Morriston.	Wm. Clayton, Oldmills.
		FIFESHIRE.	
62.	Auchterderran.	Redhouse.	Alex. Farmer, Bogside.
63.	Crossgates.	South Fod.	Wm. Reid, Brucefield.
64.	East of Fife.	Calplie.	Jas. Smart, Clephanton.
65.	Leslie.	Balquothomerie.	Robert Farmer, Finmount.
66.	West of Fife.	Dunduff.	William Fraser, Ferrybank.

NO.	NAME OF SOCIETY.	PLACE OF COMPETITION.	SILVER MEDAL AWARDED TO
	FORFARSHIRE.		
67.	Forfar and Dunnichen.	Craig Nathro.	George Sturrock, East Meathie.
68.	Isl .	Cotton of Craig.	David Edwards, Scruchloch.
69.	Kirriemuir.	Auchindorie.	Alex. M'Kenzie, Glamis.
70.	Tannadice and Oathlaw.	Battledykes.	Wm. Haggart, Barnyards.
	INVERNESS-SHIRE.		
71.	Badenoch and Rothiemurchus.	Ruthven.	R. Stewart, Killiehuntly.
72.	Glen Urquhart.	Drumnadrochit.	Alex. Ross, Balmacaan.
73	Inverness.	Dunain.	John Urquhart, Viewfield.
74.	Laggan.	Drumgask.	Angus M'Donald, Blargie.
75.	Lochaber.	Auchendall.	Dun. Cameron, Achantee.
76.	Strathdearn.	Freeburn.	Wm. M'Arthur, Streens.
77	Stratherrick	Errogie.	Alex. Fraser, Farraline.
78	Strathglass.	Erchless Mains.	Thos. Fraser, Erchless Mains.
79.	Strathnairn.	Nairnside.	Don. M'Gillivray, Drumore.
	KINCARDINESHIRE.		
80.	Durris.	Denside.	John Simpson, Spyhill.
81.	Maryculter.	Westside.	William Watt, Corkley.
82.	Nigg.	Altons.	Wm. Robertson, Kirkhill.
83.	Portlethen.	Mains of Portlethen.	Wm. Jamieson, jun., Upperton.
84.	Rickarton, Urie, &c.	Blairs.	Robt. Murray, Urie.
85	Strachan.	Mill of Cammie.	Robt. Duguid, Bowbutts.
	STEWARTRY OF KIRKCUDBRIGHT.		
86.	Corsock.	Hillside.	James Bell, Hallcroft.
87.	Kirkcudbright	Banks.	Sam. Cole, Carse.
88.	Kirkpatrick-Durham.	Lairdlaugh.	Robert Nish, Upper Minnydow.
89.	New Abbey.	Overton.	John Thorburn, Craigbill.
90.	Penninghame, &c.	Calgow.	John Ferguson, Upper Barr.
91.	Rerrick.	Portmary.	Wm. Haugh, Overlaw.
92.	Troqueer.	Crooks.	John Linwood, Carruchan.
	LANARKSHIRE.		
93.	Cadder.	Barmalloch.	Walter Stewart, Buchley.
94.	Carmunnock.	Wester Busby.	Alex. Borland, Dripps.
95.	Duneaton Water.	Balgray.	Alex. Frame, Mossbank.
96.	New Monkland (open).	Rochsolloch.	Andrew Barrie, Woodhall.
97	New Monkland.	Rochsolloch.	George Currie, Springwells.
98.	Old Monkland.	Wester Shawhead.	Fleming Smellie, Woodhall.
	LINLITHGOWSHIRE.		
99.	Blackburn.	Murrayfield.	George Pate, Balmuir.
100.	Kinneil.	Hainings.	John Stevenson, Hainings.
	NAIRNSHIRE.		
101.	Ardclach.	Mains of Glenferness.	Alex. Innes, Mains of Glenferness.
	ORKNEY.		
102.	Egilshay.	North Tafts.	Alexander Grieve, How.
103.	Evie and Rendall.	Aikerness.	John Meil, Burgar.
104.	Orkney.	Wideford.	John Sclater, Wideford.
105.	Orphir.	Gear.	Thomas Clouston, Smoogrow.
106.	Rousay and Veira.	Langskaill.	Malcolm Corsie, Brandale.
107.	St Ola.	Saaerock.	George Windwick, Birstane.
108.	Shapinshay.	Waltness.	James Foubister, Ness.
109.	South Ronaldshay.	Grutha.	Dan. Burgess, Berriedale.
110.	Stronsay.	Holland.	Peter Shearer, Airy.
111.	Tankerness.	Netherhill.	Jas. Pottinger, Hall of Tankerness.
112.	Veira.	Castlehall.	John Corsie, Helzegitha.
113.	West Mainland.	Howe.	Robert Foubister, Binscarth.
	PEEBLESSHIRE.		
114.	Eddleston Water.	Stewarton.	John Fleming, Crossburn.
	PERTHSHIRE.		
115.	Ardoch.	Quoigs.	Robert Harris, Cambushinnie.
116.	Arnprior.	Shirgarton.	Henry Gray, Birkenwood.
117.	Blairdrummond, &c.	Brierlands.	Wm. Hallam, Rossurnlane.
118.	Breadalbane (Eastern Dist.).	Ben Lawers.	Dun. M'Naughton, Ben Lawers.
119.	Breadalbane (Western Dist.).	Morenish.	Peter Dewar, Kiltyrie.

PERTHSHIRE—*continued.*

NO.	NAME OF SOCIETY.	PLACE OF COMPETITION.	SILVER MEDAL AWARDED TO
120.	Breadalbane (W. Dist. 1882).	Finlarig.	James M'Pherson, Craggantoll,
121.	Comrie.	Cuiltabraggan.	George Phillips, Dalchonzie.
122.	Culross.	Middle Grange.	Wm. Stobo, Muirside.
123.	Drummond Castle.	Leadmachony.	Alex. Crow, Wester Ochtermuthill.
124.	Dunblane,	Cairnston.	James Dick, Torrance.
125.	Foss and Strathtummel.	Foss Home Farm.	Charles M'Lauchlan, Frenich.
126.	Glenalmond.	Francisfield.	Peter Cameron, Williamston.
127.	Glenlyon.	Balantyre.	Peter Stewart, Roromore.
128.	Logiealmond, &c.	Drummond Park.	Peter Ewan, Drumbarrow.
129	Mid. District of Athole, &c.	Chapelton.	Charles Reid, Balnacraig.
130.	Monteith.	Blaircessnock.	Dnn. Dougall, Blaircessnock.
131.	Monzievaird and Strowan.	Strowan.	And. Donaldson, Carse of Lennoch.
132	Moulin.	Balnadrum.	Robert Forbes, Pittarig.
133.	North Stormont.	Logiebrae.	Alex. Forbes, jun., Stralochy.
134.	Rannoch.	Innerhadden.	John Cumming, Camghouran.
135.	St Martins.	Bandirran.	George Drummond, Westfield.
136.	Stormont Union.	Stralochy.	Alex. Forbes, Stralochie.
137.	Strathbraan.	Meikle Logie.	Peter M'Donald, Tomnagrew.
138.	Strathearn (Central).	Inner Dunning.	John Scobie, Dalreoch.
139.	Struan.	Kindrochet.	Robert Robertson, Struan.
140.	Thornhill.	Myme	Jn. Murdoch, Carse of Macorriston.
141.	Weem.	Castle Menzies.	Wm. Menzies, Weem.

RENFREWSHIRE.

142.	Cathcart and Eastwood (open).	Househillwood.	Alexander Ferguson, Westfarm.
143.	Cathcart and Eastwood.	Househillwood.	Wm. Jackson, Carrolside.
144.	Erskine and Inchinnan.	Old Mains.	John Munn, Commonside.
145.	Kilbarchan.	Mains of Milliken.	Robert Muir, Waterstone.
146.	Renfrewshire.	Linclive.	Arthur Watson, Fulwood.

ROSS-SHIRE.

147.	Black Isle.	Rhives.	J. Souter, Killen.

STIRLINGSHIRE.

148.	Baldernock.	Bogside.	Peter Smeaton, South Bardourie.
149.	Bannockburn, Plean, &c.	Pirnhall.	James Paterson, Duries Hill.
150.	Eastern Dist. of Stirlingshire.	Broomage Mains.	Thomas Stevenson, Larbert.
151.	Strathendrick.	Gartness.	Arch. M'Lauchlane, Coult.

SUTHERLANDSHIRE.

152.	Rosehall.	Achungill.	Charles Birnie, Rosehall.

WIGTOWNSHIRE.

153.	Machars.	Ravenstone Mains.	Robt M'Lellan, Ravenstone Mains.
154.	Old Luce.	High Challoch.	William M'Culloch, Blackhill.
155.	Whithorn and Glasserton.	Longhill.	Robt. M'Lellan, Ravenstone Mains.

155 Minor Silver Medals, £46, 10s.

V.—COTTAGES AND GARDENS.

1. BEST KEPT COTTAGES AND GARDENS.

ARGYLLSHIRE.

Coll	Lachlan M'Donald	Cottage	£1	0 0
	Donald M'Kinnon	do	0	10 0
	Lachlan M'Donald	Garden	1	0 0
	Hector M'Fadyen	do.	0	10 0

DUMBARTONSHIRE.

Cardross	Andrew Jeffrey	Cottage	0	10 0*
	James Cassels	do.	0	5 0*
	D. Smith	Garden	1	0 0
	James Cassels	do.	0	10 0
		Carry forward,	£3	5 0

* Half Premiums awarded, the number of Competitors being under three

		Brought forward,	£5	5 0
	EDINBURGHSHIRE.			
Currie and Balerno	John Black	Garden	1	0 0
	Charles Shanks	do.	0	10 0
	FIFESHIRE.			
Kingskettle	David Beveridge	Cottage	1	0 0
	John Scott	do.	0	10 0
	John Scott	Garden	1	0 0
	David Inglis	do.	0	10 0
Newburgh	George Bett	Cottage	1	0 0
	Charles Carswell	do.	0	10 0
	George Bett	Garden	1	0 0
	John Young	do.	0	10 0
	LANARKSHIRE.			
Abington	William Crorrie	Cottage	0	10 0*
	William Thomson	do.	0	5 0*
	John B. Forrest	Garden	1	0 0
	William Crorrie	do.	0	10 0
Larkhall	Alexander Finlayson, jun.	Cottage	1	0 0
	Allan Thomson	do.	0	10 0
	John Corbett	Garden	1	0 0
	William Scott } equal Allan Thomson }	do.	0	10 0
	LINLITHGOWSHIRE.			
Dalmeny & Queensferry	Mrs Wilson	Cottage	1	0 0
	Mrs Lawrie	do.	0	10 0
	James Hunter	Garden	1	0 0
	John Drysdale	do.	0	10 0
Kirkliston	Robert Arbuckle	do.	1	0 0
	John Weston	do.	0	10 0
Torphichen	Archibald Gardner	Cottage	1	0 0
	Walter Carlyle	do.	0	10 0
	John Shields	Garden	1	0 0
	Walter Carlyle	do.	0	10 0
	PERTHSHIRE.			
Bridge of Earn	John Campbell	Cottage	1	0 0
	David Smith	do.	0	10 0
	David Smith	Garden	1	0 0
	John Campbell	do.	0	10 0
Dunning	Peter M'Pherson	Cottage	1	0 0
	James Canning	do.	0	10 0
	Andrew Smith	Garden	1	0 0
	Thomas Callum	do.	0	10 0
	ROSS-SHIRE.			
Edderton	Hugh Fraser	Cottage	1	0 0
	James Fraser	do.	0	10 0
	James Fraser	Garden	1	0 0
	Andrew Ross	do.	0	10 0
Wester Ross	Thomas Munro	Cottage	1	0 0
	Donald Denoon	do.	0	10 0
	John M'Kenzie	Garden	1	0 0
	Alexander M'Kenzie	do.	0	10 0
	STIRLINGSHIRE.			
Killearn	Angus Dunn	Cottage	1	0 0
	Mrs Bilsland	do.	0	10 0
	Alexander M'Adam	Garden	1	0 0
	George Bauchop	do.	0	10 0
		Carry forward,	£40	10 0

* Half Premiums awarded, the number of Competitors being under three.

		Brought forward,	£40	10 0
	WIGTOWNSHIRE.			
Inch	Robert M'Graw	Cottage	1	0 0
	James Bell	do.	0	10 0
	L. Donnelly	Garden	1	0 0
	John Wilson	do.	0	10 0
			£43	10 0

2. MEDALS FOR COTTAGES AND GARDENS AND GARDEN PRODUCE.

Minor Silver Medals were awarded to the following:—

	ABERDEENSHIRE	
Kinellar	Charles Beaton	Garden
Udny	James Gellan	Cottage
	James Gellan	Garden
	AYRSHIRE.	
Galston	William Maxwell	Cut Blooms
	William Maxwell	Vegetables
Loudoun	Robert Paterson	Vegetables
	DUMBARTONSHIRE.	
Vale of Leven and Dumbarton	James Milier	Garden
	John M'Lauchlan	Flower Plot
	EDINBURGHSHIRE.	
Liberton and Newton	Robert Mitchell	Flower Plot
	Alexander Cunningham	Garden
	ELGINSHIRE.	
Dyke	William Martin	Cottage
	James Ross	Garden
	FIFESHIRE.	
Kirkcaldy	Henry Christie	Flower Plot
	James Lumsden	Flower Plot
Strathmiglo	George Watson	Garden Produce
	David M'Dougall	Garden
	HADDINGTONSHIRE.	
Pencaitland	Mrs Peter Cossar	Cottage
	John Beveridge	Garden
	LANARKSHIRE.	
Biggar	William Minto	Garden
Carnwath	William Kay	Garden
Gartsherrie	John Rollo	Cottage
	William Close	Garden
Mauldslie and Rosebank	William Muir	Garden
	William Thomson	Flower Plot
New Victoria Gardens	Samuel Brooke	Garden Plot
	William Cooke	Garden Plot
Saracen Public Gardens	Hugh Smith	Flower and Vegetable Plot
	John Watson	Vegetables
Shettleston	William Howat	Flowers
	NAIRNSHIRE.	
Auldearn	Mrs M'Kenzie	Garden
	PERTHSHIRE.	
Blairgowrie and Rattray	James M'Nicoll	Garden
Breadalbane, Weem, &c.	Alexander Cameron	Best kept Garden
	Donald Cowan	Best Cropped Garden
Caputh	John Stratton	Cottage
	Thomas M'Intyre	Garden
Cherrybank	Robert Johnstone	Cottage
	Alex. Beveridge	Garden
Dunkeld and Birnam	Thomas M'Intyre	Garden Produce

	RENFREWSHIRE.		
Renfrew	Archibald Shearer	Cut Flowers	
	Archibald Shearer	Vegetables	
	SUTHERLANDSHIRE.		
Golspie	John F. Gunn	Garden	

41 Minor Silver Medals, £10, 11s. 10d.

VI.—VETERINARY DEPARTMENT.

CLASS EXAMINATIONS—APRIL 1883.

	DICK'S VETERINARY COLLEGE.		
Kenneth James Urquhart,	Anatomy,	Silver Medal,	£0 16 0
Charles S. Smart,	Physiology,	Silver Medal,	0 16 0
Kenneth James Urquhart,	Chemistry,	Silver Medal,	0 16 0
D. J. Berry,	Materia Medica,	Silver Medal,	0 16 0
Harry M. Maxwell,	Botany,	Silver Medal,	0 16 0
Kenneth James Urquhart,	Cattle Pathology,	Silver Medal,	0 16 0
Herbert W. Hamilton,	El. Vet. Med. and Surgery,	Silver Medal,	0 16 0
Kenneth James Urquhart,	Horse Pathology,	Silver Medal,	0 16 0
	NEW VETERINARY COLLEGE, EDINBURGH.		
R. J. Hicks,	Horse Pathology,	Silver Medal,	0 16 0
R. J. Hicks,	Cattle Pathology,	Silver Medal,	0 16 0
J. A. Robinson, W. D. Connoquhie, equal	Chemistry,	Silver Medal, Silver Medal,	0 16 0, 0 16 0
A. J. Haslam,	Physiology,	Silver Medal,	0 16 0
A. J. Haslam,	Anatomy,	Silver Medal,	0 16 0
William Lothian,	Botany,	Silver Medal,	0 16 0
A. J. Haslam,	Materia Medica,	Silver Medal,	0 16 0
	GLASGOW VETERINARY COLLEGE.		
John Francis Hayes,	Horse Pathology,	Silver Medal,	0 16 0
Alexander Brown,	Cattle Pathology,	Silver Medal,	0 16 0
Andrew Stewart,	Histology and Physiology,	Silver Medal,	0 16 0
Andrew Stewart,	Anatomy,	Silver Medal,	0 16 0
Edwin Sayer,	Botany,	Silver Medal,	0 16 0
Edwin Sayer,	Chemistry,	Silver Medal,	0 16 0
John M'Kinna,	Materia Medica,	Silver Medal,	0 16 0
			£18 8 0

VII.—AGRICULTURAL CLASS, EDINBURGH UNIVERSITY.

1. Alexander H. Gibson, Kirkcaldy,	£6 0 0
2. Herbert W. Hamilton, Boghall,	4 0 0
	£10 0 0

ABSTRACT OF PREMIUMS.

1. ESSAYS AND REPORTS,			£170 0 0
2. GLASGOW SHOW, 1882,			10 0 0
3. INVERNESS SHOW, 1883,			1662 15 8
4. DISTRICT SHOWS:—			
Stock and Dairy Produce,	£307 6 10		
Special Grants,	29 0 0		
Local Societies—140 Medals to,	36 3 4		
Ploughing Associations—155 Medals to,	46 10 0		
			419 0 2
5. COTTAGES AND GARDENS—Money Premiums, £43, 10s.; 41 Minor Silver Medals, £10, 11s. 10d.,			54 1 10
6. VETERINARY DEPARTMENT—Medals to Students,			18 8 0
7. AGRICULTURAL CHAIR, EDINBURGH UNIVERSITY—Prizes to Class,			10 0 0
			£2344 5 8

STATE OF THE FUNDS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

At 30th NOVEMBER 1883.

I.	BONDS—					
	Heritable, £11,479, 16s. at 3½, and £1300 at 4 per cent.,				£12,779	16 0
	Debenture Bonds by Clyde Navigation Trustees at 4 per cent.,				6,450	0 0
	Railway Debenture Bonds at 4 per cent.,				2,000	0 0
					£21,229	16 0
II.	DEBENTURE STOCK—					
	£3,000 North British Railway Company, 4½ per cent., at £112,	£3,360	0 0			
	£2,727 Caledonian Railway Company, at 4 per cent., at £108, 10s.,	2,958	15 11			
	£1,000 London and North-Western Railway Company, at 4 per cent., at £116, 10s.,	1,165	0 0			
					7,483	15 11
III.	BANK STOCKS—					
	£6,407, 7s. 8d. Royal Bank of Scotland, at £220,	£14,096	4 10			
	2,218, 6s. 5d. Bank of England, at £297, 10s.,	6,599	10 1			
	2,000, 0s. 0d. British Linen Company Bank, at £303,	6,060	0 0			
	1,250, 0s. 0d. National Bank of Scotland, at £310,	3,875	0 0			
	1,080, 0s. 0d. Commercial Bank of Scotland, at £281, 5s.,	3,037	10 0			
	1,091, 13s. 4d. Bank of Scotland, at £307,	3,351	8 4			
					37,019	13 3
	£14,047, 7s. 5d.					

Note.—The original cost of these Bank Stocks was £22,360, 19s. 6d., showing a profit, at present prices, of £14,658, 13s. 9d.

IV.	TEN SHARES (£500) OF THE BRITISH FISHERY SOCIETY, valued at	200	0 0
V.	ARREARS OF MEMBERS' SUBSCRIPTIONS, considered recoverable,	66	2 6
		£65,999	7 8
	DEDUCT BALANCE DUE TO ROYAL BANK ON CURRENT ACCOUNT,	1,734	7 11
	AMOUNT OF FUNDS,	£64,264	19 9
VI.	BUILDING FUND—		
	1. Estimated value of Building, No. 3 George IV. Bridge,	£3,100	0 0
	2. Sum lent on Heritable Bond,	350	0 0
	3. Deposit with Royal Bank,	12	0 11
	AMOUNT OF BUILDING FUND,	£3,462	0 11
VII.	TWEEDDALE MEDAL FUND—		
	Debenture Bond with Caledonian Railway Company,	£500	0 0
VIII.	FURNITURE—		
	Estimated Value of Furniture, Paintings, Books, &c.,	£1,000	0 0

W. S. WALKER, *Treasurer.*
HEW CRICHTON, *Member of Finance Committee.*
J. TURNBULL SMITH, C.A., *Auditor.*

EDINBURGH, 8*th January* 1884.

ABSTRACT of the ACCOUNTS of the HIGHLAND and

CHARGE.

1.	Deposit with Royal Bank in name of Building Fund, of date 11th November 1882, ...						£306	3 10
2.	Deposit with Royal Bank, of date 11th November 1882, . .						2,000	0 0
3.	Arrears of Annual Subscriptions at 30th Nov. 1882,			£62	13	0		
	Whereof due by Members who have now compounded for life, and thereby extinguished, . .	£7	0 6					
	Sum ordered to be struck off as irrecoverable, . . .	27	1 6					
				34	2	0		
							28	11 0
4.	Interest and Dividends—							
	(1) Interest on Heritable Bonds, less Income-Tax,			£443	4	8		
	(2) Interest on Debenture Bonds— On £8450 at 4 per cent., less tax, . .			329	18	3		
	(3) Interest on Debenture Stock— On £3000 at 4½ per cent., less tax,	£124	9 0					
	On £3727 at 4 per cent., less tax,	145	9 2					
				269	18	2		
	(4) Interest on Deposits transferred from Building Fund,			15	0	6		
				£1,058	1	7		
	(5) Dividends on Bank Stocks—							
	£6,407, 7s. 8d. Royal Bank of Scotland,	£624	14 4					
	2,218, 6s. 5d. Bank of England,	227	8 6					
	2,000, 0s. 0d. British Linen Co. Bank, . .	280	0 0					
	1,250, 0s. 0d. National Bank of Scotland, .	187	10 0					
	1,062, 10s. 0d. Commercial Bank of Scotland, .	156	12 0					
	1,091, 13s. 4d. Bank of Scotland,	152	16 8					
				1,629	1	6		
	(6) Dividend on 10 Shares British Fishery Society,			10	0	0		
							2,697	3 1
5.	Income from Building Fund—							
	Interest on Heritable Bond, £350, . . .			£11	19	5		
	Interest on Deposit with Royal Bank, . .			0	1	6		
							12	0 11
6.	Subscriptions—							
	Annual Subscriptions, ...			£894	9	6		
	Life Subscriptions, ...			884	9	6		
							1,778	19 0
7.	Subscriptions received towards Louping-ill and Braxy Inquiry,						76	0 0
8.	Chemical Department Subscriptions, ...						20	0 0
9.	Transactions—Proceeds of sales, ...						14	3 2
10.	Balance of Receipts from Inverness Show (exclusive of Premiums paid), as shown in separate States, ...						754	5 10
11.	Balance due to Royal Bank on current account, as at 30th November 1883, ...						1,734	7 11
	Sum of Charge, . .						£9,421	14 9

Edinburgh, *8th January* 1884.

AGRICULTURAL SOCIETY of SCOTLAND for the YEAR 1882-83.

DISCHARGE.

1.	Sum due to Royal Bank on current account at 30th November 1882,					£2,559	7 7
2.	Establishment Expenses—						
	Salary to Secretary,			£850	0 0		
	Salary to Clerk, £300, and Second Clerk, £150,			450	0 0		
	Wages to Messenger,			72	0 0		
	Feu-Duty, £28; Water Duty, £2, 3s. 4d.; Taxes, £32, 13s. 7d.,			62	16 11		
	Coals, £10, 15s. 1d.; Gas, £5, 18s. 9d.; Insurance, £3, 17s. 6d.,			20	11 3		
	Repairs and Furnishings,			41	19 0		
						1,497	7 2
3.	Fee to Auditor of Accounts for year 1881-82,					50	0 0
4.	Allowance to Practical Engineer,					20	0 0
5.	Agricultural Education—						
	Grant to Professor of Agriculture, £150; Prizes, £10; Bursaries, £80; Fees to Examiners and Expenses, £34, 19s.,					274	19 0
6.	Chemical—						
	Salary and allowance to Chemist, £600, and Fees for Lectures and Analysis, £26, 5s.,			£626	5 0		
	Altering, Furnishing, and Fitting Laboratory,			66	6 0		
	Neill & Co., Printing Chemical Reports,			5	18 6		
	Experimental Stations—						
	Harelaw—Rent, £30; Taxes, £1, 7s. 6d.; Superintendent's Allowance, £15, 15s.;	£47 7 10					
	Pumpherston—Rent, £13; Superintendent's Allowance, £15, 15s.,	28 15 0					
	Manures and Seeds for Stations,	156 15 6					
	Chemist's Travelling Expenses,	19 19 0					
				252	17 4		
	Grants to Analytical Associations,			49	0 0		
						1,000	6 10
7.	Veterinary—Allowance to Professor Williams, £26, 5s.; Medals to Students, £18, 8s.,					44	13 0
8.	Expenses in connection with Inquiry into Louping-ill and Braxy, Dr Aitken, £34; Professor Williams, £28, 2s. 3d.; Mr Brotherston, £28, 17s.,					90	19 3
9.	Expenses in connection with Paintings, &c.—Galloway Bull, £60; Frame £6, 10s.; Sundries, 17s. 6d.,					67	7 6
10.	Society's Transactions — Printing, £348; Binding, £83, 6s.; Postages and Delivering, £87, 18s. 9d.; and extra Clerking Work, £38, = £557, 4s. 9d.; Essays and Reports, £108, 13s.,					665	17 9
11.	Ordinary Printing and Lithographing, £57, 6s. 6d.; Advertising, £55, 14s. 4d.; Stationery and Books, &c., £45, 7s. 3d.; Postages, &c., £57; Bank Charges, Telegrams, &c., £8, 6s. 9d.,					223	14 10
12.	Expenses in connection with Deputations to London as to Cattle Disease, Potato Culture, &c.,					84	0 6
13.	Subscriptions to Public Societies—Meteorological Society, £20; Society for Prevention of Cruelty to Animals, £5,					25	0 0
14.	Miscellaneous—Reporting General Meetings, £3, 3s.; Luncheons for Directors, £5, 8s.; Handsels, £1, 10s.; Repairing Crane and Turnstiles, £10, 8s.; Restriking Medals, 8s., and Travelling Expenses in connection with Nomination of Directors, £22, 2s. 6d.,					42	19 6
15.	Premiums—						
	Stirling Show 1881,			£14	0 0		
	Glasgow Show 1882,			315	10 2		
	Inverness Show 1883,			1,408	15 8		
				£1,738	5 10		
	District Competitions,	£743 14 0					
	Cottages and Gardens,	87 16 0					
	Ploughing Competitions,	46 16 0					
				878	6 0		
						2,616	11 10
16.	Interest on Overdraft on Current Account with Royal Bank for year to 30th November 1883,					18	2 1
17.	Arrears of Subscriptions struck off as irrecoverable,					62	4 6
18.	Arrears considered recoverable,					66	2 6
19.	Deposit with Royal Bank in name of Building Fund, Nov. 13, 1883,					12	0 11
	Sum of Discharge,					£9,421	14 9

W. S. WALKER, *Treasurer.*
HEW CRICHTON, *Member of Finance Committee.*
J. TURNBULL SMITH, C.A., *Auditor.*

ABSTRACT OF ACCOUNTS

CHARGE.

1. Local Subscriptions—						
Voluntary Assessment on Proprietors—						
Inverness-shire,					£532	1 2
Elginshire,					290	10 0
Ross-shire,					279	3 8
Cromartyshire,					0	0 0
Caithness-shire (£20 not yet received),					140	0 0
Sutherlandshire,					50	0 0
Nairnshire,					75	9 8
Town of Inverness,					50	0 0
Local Societies—						
Inverness Society £50 (not yet received),		£0	0 0			
Northern Pastoral Club,		20	0 0			
Easter Ross Society,		25	0 0			
					45	0 0
					£1,462	4 6
2. Amount Collected during Show—						
Drawn at Gates,		£1,120	6 6			
Drawn at Grand Stand,		52	10 0			
Season Tickets,		16	0 0			
Catalogues and Awards sold,		103	4 4			
Drawn at Gentlemen's Room and Cloak Room,		2	13 6			
					1,294	14 4
3. Rent of Stalls,					1,067	17 0
4. Rent of Refreshment Booths,					150	0 0
5. Forfeited Deposit Money for Return of Horses,					16	0 0
6. Interest from Tweeddale Medal Fund,					19	10 8
7 Interest from Royal Bank,					1	12 3
					£4,011	18 9
Balance of Payments,					654	9 10
					£4,666	8 7

Edinburgh, *8th January* 1884.

ABSTRACT of the ACCOUNTS of the

CHARGE.

1. Funds as at 30th November 1882—						
Debenture Bond by Caledonian Railway Company,					£1,000	0 0
Debenture Stock of the North British Railway Company,					1,200	0 0
Funded Debt of the Clyde Navigation Trustees, £3000, purchased at					2,970	0 0
Stock of the Royal Bank of Scotland, £305, purchased at					671	0 0
					£5,841	0 0
Balance in Bank at 30th November 1882,					336	19 0
					£6,177	19 0
2. Income received—						
On £1000 Caledonian Railway Company Debenture Bond at 3¾ per cent., £37, 10s., less tax, 17s. 6d.,		£36	12 6			
On £1200 North British Railway Company Debenture Stock at 4¼ per cent., £51, less tax, £1, 4s. 5d.,		49	15 7			
On £3000 Funded Debt Clyde Navigation Trustees at 4 per cent., £120, less tax, £2, 17s. 6d.,		117	2 6			
		£203	10 7			
On £305 Royal Bank Stock for year,		29	14 9			
On Bank Account,		3	10 8			
					236	16 0
Sum of Charge,					£6,414	15 0

Edinburgh, *8th January* 1884.

of the INVERNESS SHOW, 1883.

DISCHARGE.

1.	Show-Yard Expenditure— Fitting up, £1948, 12s. 1d.; Rent of Field, £70; Carriage of Turnstiles, &c., £4, 7s. 7d.; Miscellaneous, £3, 3s. 9d.,			£2,026	3 5
2.	Forage and Bedding for Stock,			225	19 7
3.	Police,			43	7 10
4.	Travelling Expenses of Judges, Stewards, &c.,			214	11 3
5.	Hotel and other Bills for Judges, Directors, &c.,			337	6 1
6.	Music in Show-Yard,			40	10 0
7.	Printing Catalogues and Awards, and Lithographing Tickets and Badges,			146	9 6
8.	Advertising,			23	19 6
9.	Allowance to Local Secretary and Clerks,			20	0 0
10.	Allowance to Local Veterinary Inspector,			10	0 0
11.	Allowance to Practical Engineer,			18	18 0
12.	Clerks and Assistants,			50	10 0
13.	Attendants at Turnstiles and Ticket Gates,			65	11 0
14.	Postage and Receipt Stamps,			34	6 9
	Amount of General Expenses,			£3,257	12 11
15.	Premiums drawn at 30th November 1883,			1,408	15 8
Note.—To the Balance of Payments of		£654	9 10		
There must be added the Premiums undrawn at 30th November, amounting to		254	0 0		
		£908	9 10		
But deduct Contributions to be received from Inverness Society £50, and Caithness £20,		70	0 0		
Making the probable Loss,		£838	9 10		
				£4,666	8 7

W. S. WALKER, *Treasurer.*
HEW CRICHTON, *Member of Finance Committee.*
J. TURNBULL SMITH, *Auditor.*

ARGYLL NAVAL FUND for 1882-83.

DISCHARGE.

1.	Allowances to the five following Recipients—				
	Charles Hope Dundas, fifth year,			£40	0 0
	Edward Walrond de Wells Bruce, fourth year,			40	0 0
	Edward W. Elphinstone Wemyss, fourth year,			40	0 0
	Lewis Wentworth Chetwynd, fourth year,			40	0 0
	G. P. W. Hope, first year,			40	0 0
				£200	0 0
2.	Funds as at 30th November 1883—				
	Debenture Bond by Caledonian Railway Company,	£1,000	0 0		
	Debenture Stock of the North British Railway Company,	1,200	0 0		
	Funded Debt of the Clyde Navigation Trustees, £3000, purchased at	2,970	0 0		
	Stock of the Royal Bank of Scotland, £305, purchased at	671	0 0		
		£5,841	0 0		
	Balance in Bank at 30th November 1883,	373	15 0		
				6,214	15 0
	Sum of Discharge,			£6,414	15 0

W. S. WALKER, *Treasurer.*
HEW CRICHTON, *Member of Finance Committee.*
J. TURNBULL SMITH, *Auditor.*

VIEW OF THE INCOME AND EXPENDITURE

For the Year 1882-83.

INCOME.

Annual Subscriptions and Arrears received,			£801 14 6
Life Subscriptions received,			877 8 6
			£1,679 3 0
Interests and Dividends received—			
Interests,	£1,058 1 7		
Dividends,	1,639 1 6		
		2,697 3 1	
4. Income from Building Fund Account,		12 0 11	
5. Subscriptions received towards Louping-ill and Braxy Inquiry,		76 0 0	
6. Chemical Department—Subscriptions,		20 0 0	
7. Transactions—Proceeds of Sales,		14 3 2	
8. Balance of Receipts from Inverness Show, excluding Premiums paid,		754 5 10	
Sum of Income,		£5,252 16 0	

EXPENDITURE.

1. Establishment—			
Salaries and Wages,	£1,372 0 0		
Feu-Duties, Taxes, Coals, Gas, Insurance, and Repairs and Furnishings,	125 7 2		
	£1,497 7 2		
2. Fee to Auditor for 1881-82,	50 0 0		
3. Fee to Practical Engineer,	20 0 0		
4. Agricultural Education (including Bursaries and Fees to Examiners),	274 19 0		
5. Chemical Department,	1,000 6 10		
6. Veterinary Department,	44 13 0		
7. Expenses in connection with Inquiry into Louping-ill and Braxy,	90 19 3		
8. Expenses in connection with Paintings, &c.,	67 7 6		
9. Transactions,	665 17 9		
10. Ordinary Printing, Advertising, Stationery, Stamps, Bank Charges, and Telegrams,	223 14 10		
11. Expenses in connection with Deputations to London,	84 0 6		
12. Subscriptions to Public Societies,	25 0 0		
13. Miscellaneous,	42 19 6		
14. Premiums—			
Stirling Show, £14 0 0			
Glasgow Show, 315 10 2			
Inverness Show, 1,408 15 8			
District Competitions, 743 14 0			
Cottages and Gardens, 87 16 0			
Ploughing Competitions, 46 16 0			
	2,616 11 10		
15. Interest on Overdraft on Royal Bank Current Account,	18 2 1		
Sum of Expenditure,		6,721 19 3	
Balance of Expenditure,		£1,469 3 3	

W. S. WALKER, *Treasurer.*
HEW CRICHTON, *Member of Finance Committee.*
J. TURNBULL SMITH, C.A., *Auditor.*

Edinburgh, 8*th January* 1884.

APPENDIX (B).

PREMIUMS

OFFERED BY

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND IN 1884.

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GENERAL NOTICE.

THE HIGHLAND SOCIETY was instituted in the year 1784, and incorporated by Royal Charter in 1787. Its operation was at first limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were abandoned, while the progress of agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have, for the greater part of a century, been directed to the promotion of the science and practice of agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter, in 1834, to THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

The leading purposes of the Institution are set forth in the following pages, where it will be found that Premiums are offered for Reports on almost every subject connected with the cultivation of the soil; the rearing and feeding of stock; the management of the dairy; the improvement of agricultural machinery and implements; the growth of timber; the extension of cottage accommodation; the application of chemical science; and the dissemination of veterinary information.

Among the more important measures which have been effected by the Society are—

1. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal towns of Scotland, at which exhibitors from all parts of the United Kingdom are allowed to compete.

2. A system of District Shows instituted for the purpose of improving the breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of Local Agricultural Associations.

3. The encouragement of Agricultural Education, under powers conferred by a supplementary Royal Charter, granted in 1856, and authorising "The COUNCIL of the HIGHLAND AND AGRICULTURAL SOCIETY ON EDUCATION" to grant Diplomas to Students of Agriculture; and by the establishment of Bursaries.

4. The establishment of Agricultural Stations for the purpose of promoting the application of science to agriculture, and the appointment of a chemist to superintend all experiments conducted at these Stations, and prepare a Report of the same to be published in the Transactions. Also to subsidise, under certain conditions, Local Analytical Associations.

5. The advancement of the Veterinary Art, by conferring Certificates on Students who have passed through a prescribed curriculum, and who are found, by public examination, qualified to practise. Now terminated in accordance with arrangements with the Royal College of Veterinary Surgeons.

6. The appointment of a Board of Examiners, and the granting of First and Second Class Certificates in Forestry.

7. The annual publication of the Transactions, which comprehend the Prize-Reports, and reports of experiments, also an abstract of the business at Board and General Meetings, and other communications.

8. The management of a fund left by John, 5th Duke of Argyll (the original President of the Society) to assist young natives of the Highlands who enter Her Majesty's Navy.

CONSTITUTION AND MANAGEMENT.

The general business of THE HIGHLAND AND AGRICULTURAL SOCIETY is conducted under the sanction and control of a Royal Charter, which authorises the enactment of Bye-Laws. Business connected with Agricultural Education is conducted under the authority of a supplementary Royal Charter, also authorising the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Thirty-two Ordinary and Twenty Extraordinary Directors, a Treasurer, an Honorary and an Acting Secretary, an Auditor, and other Officers.

The Directors meet on the first Wednesday of each month from November to June; seven being a quorum. The proceedings of the Directors are reported to General Meetings of the Society, held in January and in June or July.

With reference to motions at General Meetings, Bye-Law No. 10 provides—"That at General Meetings of the Society no motion or proposal (except of mere form or courtesy) shall be submitted or entertained for immediate decision unless notice thereof has been given a week previously to the Board of Directors, without prejudice, however, to the competency of making such motion or proposal to the effect of its being remitted to the Directors for consideration, and thereafter being disposed of at a future General Meeting."

The Council on Education, under the Supplementary Charter, consists of Sixteen Members—Nine nominated by the Charter, and Seven elected by the Society. The Board of Examiners consists of Ten Members.

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June or July, but it is not necessary that the proposer should attend the meeting. The ordinary subscription is £1, 3s. 6d. annually, which may be redeemed by one payment, varying, according to the number of previous annual payments, from £12, 12s. to £7, 1s. Proprietors farming the whole of their own lands, whose assessment on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Office-Bearers of Local Agricultural Associations, Resident Agricultural Factors, Land Stewards, Foresters, Agricultural Implement Makers, and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, are admitted on a subscription of 10s. annually, which may be redeemed by one payment, varying, according to the number of previous annual payments, from £5, 5s. to £3. Subscriptions payable on election, and afterwards annually in January. According to the Charter, a Member who homologates his election by paying his first subscription cannot retire until he has paid in annual subscriptions, or otherwise, an amount equivalent to a life composition. Members having candidates to propose are requested to state whether the candidate should be on the £1, 3s. 6d. or 10s. list.

Members of the Society receive the Transactions free on application to the Secretary, and are entitled to apply for District Premiums—to report Ploughing Matches for the Medal—to free admission to the Showyard, and to exhibit Stock at reduced rates. Firms are not admitted as Members, but if one partner of a firm becomes a Member, the firm is allowed to exhibit at Members' rates.

Orders, payable at the Royal Bank of Scotland, Edinburgh, are issued by the Directors, in name of the persons in whose favour Premiums have been awarded.

All communications must be addressed to "FLETCHER NORTON MENZIES, Esq., Secretary of the Highland and Agricultural Society of Scotland, No. 3 George IV. Bridge, Edinburgh."

ESTABLISHMENT FOR 1884.

President.

His Grace The DUKE of RICHMOND and GORDON, K.G.,
49 Belgrave Square, London.

Vice-Presidents.

The Marquis of Lothian, K.T., Newbattle Abbey, Dalkeith.
The Earl of Haddington, Tyninghame, Prestonkirk.
The Earl of Wemyss and March, Gosford, Longniddry.
The Earl of Hopetoun, Hopetoun House, South Queensferry.

Ordinary Directors.

David Ainslie of Costerton, Blackshiels.
John Balfour of Balbirnie, Markinch.
Thomas Elliot, Blackhaugh, Galashiels.
Rev. John Gillespie, Mouswald Manse, Dumfries.
Lieut.-Colonel Hare of Calder Hall, Philpston House, Winchburgh.
Gideon Pott of Dod, Knowesouth, Jedburgh.
Walter Scott, Glendronach, Huntly.
Andrew Allan, Munnoch, Dalry, Ayrshire.
Arthur H. Johnstone Douglas of Lockerbie, Glen Stuart, Annan.
Alexander Dudgeon, Easter Dalmeny, Queensferry.
Thomas Gordon Duff, Park House, Banff.
James Mollison, Dochgarroch Lodge, Inverness.
Thomas Munro Nicoll, Littleton, Kirriemuir.
George J. Walker, Portlethen, Aberdeen.
Sir Charles E. F. Stirling of Glorat, Bart., Milton of Campsie.
Sir Henry J. Seton Steuart of Allanton and Touch, Bart., 9 Charlotte Square.
Lawrence Drew, Merryton, Hamilton.
Robert Easson, Scones Lethendy, Perth.
Robert O. Farquharson of Haughton, Alford, N.B.
Duncan Forbes of Culloden, Inverness.
James M'Queen of Crofts, Dalbeattie.
John T. S. Paterson, Plean Farm, Bannockburn.
James Shaw, Skaithmuir, Coldstream.
William Wilson, Wolfstar, Tranent.
James T. S. Elliot, yr. of Wolfelee, Hawick.
John Marr, Cairnbrogie, Old Meldrum.
Niven Matthews, Whitehills, Sorbie, Wigtownshire.
Jonathan Middleton, Clay of Allan, Fearn, Ross-shire.
James Murray, Catter House, Drymen.
Robert Paterson of Birthwood, Biggar.
R. G. Wardlaw Ramsay of Whitehill, Rosewell.
Harry Young of Cleish Castle, Kinross.

Extraordinary Directors.

Lord Elcho, M.P., Gosford, Longniddry.
Right Hon. George Harrison, Lord Provost of Edinburgh.
Sir Alexander Kinloch of Gilmerton, Bart., Drem.
Sir Hew Dalrymple of North Berwick, Bart., Luchie, North Berwick.
Sir James R. Gibson-Maitland of Barnton, Bart., Craigend, Stirling.
Sir William Baillie of Polkemmet, Bart., Whitburn.
Sir James H. Gibson-Craig of Riccarton, Bart., Currie.
Robert Dundas of Arniston, Gorebridge.
Colonel A. Learmonth of Dean, Woodcroft, St Boswells.
Peter M'Lagan of Pumpherston, M.P., Clifton Hall, Ratho.
Alexander Forbes Irvine of Drum, 25 Castle Terrace, Edinburgh.
James Hope, East Barns, Dunbar.
Colonel Gillon of Wallhouse, Bathgate.
William Dingwall, Ramornie, Ladybank.
Adam Smith, Stevenson Mains, Haddington.
Thomas Mylne, Niddrie Mains, Liberton.
John Scott Dudgeon, Longnewton, St Boswells.
John M. Martin of Auchendennan, Bloomhill, Cardross.
Colin J. Mackenzie of Portmore, Eddleston.
F. E. Villiers, Closeburn Hall, Thornhill, N.B.

Office-Bearers.

William Stuart Walker of Bowland, C.B., *Treasurer.*
Sir G. Graham Montgomery of Stanhope, Bart., *Honorary Secretary.*
Fletcher Norton Menzies, *Secretary.*
Rev. James Grant, D.C.L., D.D., *Chaplain.*
Andrew P. Aitken, D.Sc., *Chemist.*
John Turnbull Smith, C.A., *Auditor.*
Murray & Falconer, W.S., *Law Agents.*
J. Wilson, F.R.S.E., F.G.S., University of Edin., *Professor of Agriculture.*
* * * *Professor of Botany.*
David Stevenson, F.R.S.E., M.I.C.E., *Consulting Engineer.*
James D. Park, *Practical Engineer.*
Thomas Duncan, *Recorder and Clerk.*
John Macdiarmid, *Second Clerk.*
Gourlay Steell, R.S.A., *Animal Portrait Painter.*
William Williams, F.R.C.V.S., *Professor of Veterinary Surgery.*
Thomas Walley, M.R.C.V.S., *Professor of Cattle Pathology.*
William Blackwood & Sons, *Publishers.*
Neill & Company, *Printers.*
G. Waterston & Sons, *Stationers.*
Hamilton, Crichton, & Co., *Silversmiths and Medallists.*
John Watherston & Sons, *Inspectors of Works.*
William Simpson, *Messenger.*

Chairman of Committees.

1.	*Argyll Naval Fund*, .	Admiral Maitland Dougall of Scotscraig, Tayport.
2.	*Chemical Department*, .	Colin J. Mackenzie of Portmore, Eddleston.
3.	*Cottages and Gardens*, .	Lieut.-Col. Hare of Calder Hall.
4.	*District Shows*, . .	A. Campbell Swinton of Kimmerghame, Duns.
5.	*Finance*, . . .	Anthony Murray of Dollerie.
6.	*General Shows*, . .	Colonel Gillon of Wallhouse, Bathgate.
7.	*Hall and Chambers*, .	John Ord Mackenzie of Dolphinton.
8.	*Highland Industries, &c.*	Sir James H. Gibson-Craig of Riccarton, Bart.
9.	*Law*, ...	Thomas Graham Murray, W.S.
10.	*Machinery*, . . .	Thomas Mylne, Niddrie Mains, Liberton.
11.	*Ordnance Survey*, .	Robert Dundas of Arniston, Gorebridge.
12.	*Publications, &c.*, .	Alexander Forbes Irvine of Drum.
13.	*Veterinary Department*,	James Hope, East Barns, Dunbar.

General Meetings.—By the Charter the Society must hold two General Meetings, and, under ordinary circumstances, they are held on the third Wednesday of the months of January and June, at one o'clock, in the Society's Hall, 3 George IV. Bridge, for the election of Members and other business.

Meeting at Edinburgh.—By a resolution of the General Meeting on 15th January 1879, a General Meeting of Members is held in the Showyard on the occasion of the Annual Show. This year it will be held at Edinburgh, on Wednesday 23rd July, at 1.30 p.m.

General Show at Edinburgh.—22nd, 23rd, 24th, and 25th July,—Entries close for Implements, 21st May—Stock, 4th June.

Directors Meetings.—The Board of Directors meet on the first Wednesday of each month from November till June inclusive, at 1.30 p.m., and occasionally as business may require, on a requisition by three Directors to the Secretary, or on intimation by him.

Nomination of Directors.—Meetings of Members, for the purpose of nominating Directors to represent the Show Districts on the Board, will be held at the places and on the days aftermentioned :—

1. Perth, Royal George Hotel, . . . Friday, 1st August, at 1.
2. Glasgow, George Hotel, . . . Wednesday, 6th Aug., at 1.
3. Stirling, Golden Lion Hotel, . . Friday, 8th August, at 1.
4. Aberdeen, Imperial Hotel, . . . Friday, 15th August, at 1.
5. Edinburgh, 3 George IV. Bridge, . . Wednesday, 20th Aug., at 2.
6. Inverness, Caledonian Hotel, . . Friday, 22nd Aug., at 12.30.
7. Dumfries, King's Arms Hotel, . . Wednesday, 27th Aug., at 1.
8. Kelso, Secretary's Tent, Ram Sale Ground, Friday, 12th Sept., at 1.

The nomination of Tenant Farmers, or other Members paying the lower subscription, must be made in the 1st, 2nd, 5th, and 8th Districts ; and the nomination of Proprietors is recommended in the 3rd, 4th, 6th, and 7th.

Committee Meetings.

Highland Industries.—First Tuesday in November, at 12 noon.

Machinery.—First Tuesday in November, at 1 p.m.

General Shows. — First Tuesday in November, at 2 p.m., and first Tuesday in June at 2 p.m.

Publications. — First Wednesday in November, at 12 noon, and first Wednesday in January, at 12 noon.

Cottages and Gardens.—First Tuesday in December, at 12 noon.

District Shows.—First Tuesday in December, at 12.30 p.m.

Chemical—First Tuesday in December, at 2 p.m., and first Tuesday in March, at 2 p.m.

The other Standing Committees—Argyll Naval Fund, Finance, Hall and Chambers, Law, Ordnance Survey, and Veterinary, meet when required.

Examinations for the Society's Diploma and Certificates in Agriculture and Certificates in Forestry are held annually in the end of March or beginning of April.

Examinations for the Society's Bursaries are held annually in October.

COMMITTEES FOR 1884.

1. ARGYLL NAVAL FUND.

Admiral Maitland Dougall of Scotscraig, R.N., Tayport, *Convener.*
Lord Elphinstone, Carberry Tower, Musselburgh.
Admiral Sir William Edmonstone of Duntreath, Bart.
Hew Crichton, S.S.C., 13 Nelson Street, Edinburgh.

2. CHEMICAL DEPARTMENT.

C. J. Mackenzie of Portmore, Eddleston, *Convener.*
Sir Alexander M. Mackenzie of Delvine, Bart., Dunkeld.
Professor Douglas Maclagan, 28 Heriot Row, Edinburgh.
Professor Wilson, University, Edinburgh.
P. B. Swinton, Holyn Bank, Gifford.
John Munro, Fairnington, Roxburgh.
Adam Smith, Stevenson Mains, Haddington.
Charles Smith, Whittinghame, Prestonkirk.
John Scott Dudgeon, Longnewton, St Boswells.
George R. Glendinning, Hatton Mains, Ratho.
Alex. R. Melvin, Bonnington, Wilkieston.
David Ainslie of Costerton, Blackshiels.
Lieut.-Col. Hare of Calder Hall, Philpston House, Winchburgh.
Hugh Lindsay, Meadowflatt, Thankerton.
Dr Andrew P. Aitken, 8 Clyde Street, Edinburgh, *Chemist.*

3. COTTAGES AND GARDENS.

Lieut.-Col. Hare of Calder Hall, *Convener.*
John Ord Mackenzie of Dolphinton.
Archibald Campbell Swinton of Kimmerghame, Duns.
C. J. Mackenzie of Portmore, Eddleston.
James Hope, East Barns, Dunbar.

4. DISTRICT SHOWS.

Archibald Campbell Swinton of Kimmerghame, *Convener.*
F. E. Villiers, Closeburn Hall, Thornhill, *Vice-Convener.*
Sir James R. Gibson-Maitland of Barnton, Bart., Craigend, Stirling.
Sir James H. Gibson-Craig of Riccarton, Bart., Currie.
Thomas Mylne, Niddrie Mains, Liberton.
Adam Smith, Stevenson Mains, Haddington.
James Hope, East Barns, Dunbar.
Thomas Elliot, Blackhaugh, Galashiels.
Lieut.-Col. Hare of Calder Hall, Philpston House, Winchburgh.
Lawrence Drew, Merryton, Hamilton.
J. T. S. Paterson, Plean Farm, Bannockburn.
James M'Queen of Crofts, Dalbeattie.
Robert Paterson of Birthwood, Biggar.

5. FINANCE.

Anthony Murray of Dollerie, *Convener.*
William S. Walker of Bowland, C.B., *Treasurer.*
Sir G. Graham Montgomery of Stanhope, Bart.
Hew Crichton, S.S.C., 13 Nelson Street, Edinburgh.
Thomas A. Hog of Newliston, Kirkliston.
James Auldjo Jamieson, W.S., Edinburgh.
Patrick Blair, W.S., York Place.
John Turnbull Smith, C.A., 29 St Andrew Square.

6. GENERAL SHOWS.

Colonel GILLON of Wallhouse, Bathgate, *Convener.*
Lord ARTHUR CECIL, Orchard Mains, Innerleithen.
Sir MICHAEL R. SHAW STEWART of Greenock and Blackhall, Bart.
Sir ALEXANDER KINLOCH of Gilmerton, Bart., Drem.
Sir ALEXANDER MUIR MACKENZIE of Delvine, Bart., Dunkeld.
Sir JAMES H. GIBSON-CRAIG of Riccarton, Bart.
THOMAS MYLNE, Niddrie Mains, Liberton.
ALEXANDER YOUNG, Keir Mains, Dunblane.
WILLIAM FORD, Fentonbarns, Drem.
ANDREW MITCHELL, Alloa.
ALEXANDER FORBES IRVINE of Drum.
WALTER SCOTT, Glendronach, Huntly.
Rev. JOHN GILLESPIE, Mouswald Manse, Dumfries.
JAMES HOPE, East Barns, Dunbar.
GIDEON POTT of Dod, Knowesouth, Jedburgh
C. J. MACKENZIE of Portmore, Eddleston.
JAMES CUNNINGHAM, Tarbreoch, Dalbeattie.
ANDREW ALLAN, Munnoch, Dalry, Ayrshire.
FRED. E. VILLIERS, Closeburn Hall, Thornhill.
A. H. JOHNSTONE DOUGLAS of Lockerbie, Glen Stuart, Annan.
LAWRENCE DREW, Merryton, Hamilton.
JAMES M'QUEEN of Crofts, Dalbeattie.
ROBERT PATERSON of Birthwood, Biggar.
ADAM SMITH, Stevenson Mains, Haddington.
THOMAS ELLIOT, Blackhaugh, Galashiels.
JONATHAN MIDDLETON, Clay of Allan, Fearn.
J. M. MARTIN of Auchendennan, Bloomhill, Cardross.

7. HALL AND CHAMBERS.

JOHN ORD MACKENZIE of Dolphinton, *Convener.*
Sir JAMES GARDINER BAIRD of Saughton Hall, Bart.
ANTHONY MURRAY of Dollerie. 141 George Street, Edinburgh.
DAVID STEVENSON, C.E., 84 George Street, Edinburgh.
WILLIAM S. WALKER of Bowland, C.B.

8. HIGHLAND INDUSTRIES AND FISHERIES.

Sir JAMES H. GIBSON-CRAIG of Riccarton, Bart., *Convener.*
Sir JAMES RAMSAY GIBSON-MAITLAND of Barnton, Bart.
Sir KENNETH S. MACKENZIE of Gairloch, Bart.
Lieut.-General BURROUGHS of Rousay, C.B., Orkney.
ALEXANDER FORBES IRVINE of Drum.
Professor WILSON, University, Edinburgh.
ARCHIBALD YOUNG, 22 Royal Circus, Edinburgh.
ALEXANDER HENDERSON of Stemster.
WILLIAM ANDERSON SMITH, Ledaig, Argyllshire.

9. LAW.

THOMAS GRAHAM MURRAY, W.S., 11 Randolph Crescent, *Convener.*
JOHN ORD MACKENZIE of Dolphinton, W.S., Edinburgh.
WILLIAM S. WALKER of Bowland, C.B.
ANTHONY MURRAY of Dollerie, W.S., Edinburgh.
HEW CRICHTON, S.S.C., 13 Nelson Street, Edinburgh.
JAMES AULDJO JAMIESON, W.S., Edinburgh.
PATRICK BLAIR, W.S., York Place.

10. MACHINERY.

THOMAS MYLNE, Niddrie Mains, *Convener.*
Lord ARTHUR CECIL, Orchard Mains, Innerleithen.

Sir James R. Gibson-Maitland of Barnton, Bart.
David Stevenson, C.E., 84 George Street, Edinburgh.
Professor Wilson, University, Edinburgh.
John Munro, Fairnington, Roxburgh.
P. B. Swinton, Holyn Bank, Gifford.
C. J. Mackenzie of Portmore, Eddleston.
John Kemp, Stirling.
James A. R. Main, Clydesdale Iron Works, Possil Park, Glasgow.
John Marshall, Maybole.
John Young, jun., Ayr.
A. H. Johnstone Douglas of Lockerbie, Glen Stuart, Annan.
T. M. Nicoll, Littleton, Kirriemuir.
Alexander Dudgeon, Easter Dalmeny, Queensferry.
James Shaw, Skaithmuir, Coldstream.
J. T. S. Paterson, Plean Farm, Bannockburn.
Niven Mathews, Whitehills, Sorbie.
James T. S. Elliot, yr. of Wolfelee, Hawick.
James D. Park, Greenside Lane, Edinburgh, *Practical Engineer.*

11. ORDNANCE SURVEY.

Robert Dundas of Arniston, *Convener.*
C. J. Mackenzie of Portmore, Eddleston.
William S. Walker of Bowland, C.B.

12. PUBLICATIONS AND PREMIUMS FOR REPORTS

Alexander Forbes Irvine of Drum, *Convener.*
Sir Alex. Muir Mackenzie of Delvine, Bart., Dunkeld.
Sir James R. Gibson-Maitland of Barnton, Bart.
William S. Walker of Bowland, C.B.
Professor Wilson, University, Edinburgh.
Robert Scot Skirving, 29 Drummond Place, Edinburgh.
P. B. Swinton, Holyn Bank, Gifford.
Thomas Mylne, Niddrie Mains, Liberton.
David Stevenson, C.E., 84 George Street, Edinburgh.
Dr Cleghorn of Stravithie, St Andrews.
C. J. Mackenzie of Portmore, Eddleston.
Rev. John Gillespie, Mouswald Manse, Dumfries.
William Macdonald, Editor, *North British Agriculturist*, Edinburgh.
F. E. Villiers, Closeburn Hall, Thornhill.
John Scott Dudgeon, Longnewton, St Boswells.
James T. S. Elliot, yr. of Wolfelee, Hawick.

13. VETERINARY DEPARTMENT

James Hope, East Barns, Dunbar, *Convener.*
Lord Arthur Cecil, Orchard Mains, Innerleithen.
Sir James H. Gibson-Craig of Riccarton, Bart.
Sir Alexander Kinloch of Gilmerton, Bart., Drem.
Colonel Gillon of Wallhouse, Bathgate.
William S. Walker of Bowland, C.B.
Thomas Mylne, Niddrie Mains, Liberton.
Adam Smith, Stevenson Mains, Haddington.
Colonel Williamson of Lawers, Crieff.
Lieut.-Colonel Hare of Calder Hall.

The President, Vice-Presidents, and Honorary Secretary are members *ex officio* of all Committees.

AGRICULTURAL EDUCATION.

CERTIFICATES AND DIPLOMA IN AGRICULTURE.

Council on Education.

By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to grant Diplomas.

Members of Council named by Charter.

The President of the Highland and Agricultural Society—*President.*
The Lord Justice-General—*Vice-President.*

The Lord Advocate.
The Dean of Faculty.
The Professor of Agriculture.
The Professor of Anatomy.
The Professor of Botany.
The Professor of Chemistry.
The Professor of Natural History.

Members of Council nominated by Society.

The Duke of Buccleuch, K.G.
William S. Walker of Bowland, C.B.
John Wilson, Wellnage.
Thomas Mylne, Niddrie Mains.
Robert Dundas of Arniston.
John Munro, Fairnington.
A. Campbell Swinton of Kimmerghame.

Board of Examiners.

1. *Science and Practice of Agriculture.*—Professor Wilson; John Wilson, Wellnage, Duns; Thomas Mylne, Niddrie Mains, Liberton; and John Munro, Fairnington, Roxburgh.
2. *Botany.*—Dr Cleghorn.
3. *Chemistry.*—Dr A. P. Aitken.
4. *Natural History.*—Dr Ramsay H. Traquair.
5. *Veterinary Science.*—Professor Williams.
6. *Field Engineering.*—David Stevenson, M. Inst. C.E.
7. *Book-keeping.*—John Turnbull Smith, C.A.

Standing Acting Committee.

The Lord Justice-General—*Convener.*

The Professor of Agriculture.
The Professor of Botany.
The Professor of Chemistry.
Thomas Mylne, Niddrie Mains.
John Munro, Fairnington.
A. Campbell Swinton of Kimmerghame.

Bye-Laws.

I. That, in terms of the Charter, the Society shall nominate seven members to act on the Council on Education.

II. That the Council shall appoint a Board of Examiners on the following subjects:—Science and Practice of Agriculture; Botany; Chemistry; Natural History; Veterinary Science; Field Engineering; and Book-keeping.

III. That the examinations shall be both written and oral, that the value of the answers shall be determined by numbers, and that the oral examinations shall be public.

IV. That there shall be three examinations,* to be styled respectively the "Second Class Certificate Examination," the "First Class Certificate Examination," and the "Diploma Examination."

V. That to pass the "Second Class Certificate Examination," a candidate must be acquainted with the science and practice of agriculture, elementary chemistry, field engineering, and book-keeping; and that a certificate in the following terms, bearing the corporate seal and arms of the Society, signed by the President or Vice-President of the Council on Education, the Examiners, and by the Secretary, shall be granted to a candidate passing this examination :—

"These are to certify that on the A. B. was examined, and has been found to possess a knowledge of the science and practice of agriculture, elementary chemistry, field engineering, and book-keeping."

VI. That to pass the "First Class Certificate Examination" a candidate must be acquainted with the science and practice of agriculture, botany, chemistry, natural history, veterinary science, field engineering, and book-keeping; and that a certificate in the following terms, bearing the corporate seal and arms of the Society, signed by the President or Vice-President of the Council on Education, the Examiners, and by the Secretary, shall be granted to candidates passing this examination :—

"These are to certify that on the A. B. was examined, and has been found to possess a knowledge of the science and practice of agriculture, botany, chemistry, natural history, veterinary science, field engineering, and book-keeping."

VII. That to pass the "Diploma Examination" a candidate must possess a *thorough knowledge* of the science and practice of agriculture, botany, chemistry, natural history, veterinary science, field engineering, and book-keeping; and that a diploma in the following terms, bearing the corporate seal and arms of the Society, and signed by the President and Vice-President of the Council on Education, the Examiners, and by the Secretary, shall be granted to candidates passing this examination :—

"These are to certify that, on the A. B. was examined, and has been found to be proficient in the science and practice of agriculture, botany, chemistry, natural history, veterinary science, field engineering, and book-keeping."

VIII. That each successful candidate for the Society's Agricultural Diploma shall thereby become eligible to be elected a free life member of the Society.

IX. That the Society shall grant annually ten bursaries of £20 each; and five of £10 each, to be competed for by pupils of schools to be approved of by the Directors, which include or are willing to introduce the teaching of chemistry, and the following branches of natural science—physical geography, botany, and geology, into their curriculum.

X. That the £20 bursaries† shall be tenable for one year at the University of Edinburgh, for the purpose of enabling the holders to take the classes necessary to qualify for the Society's certificate or diploma; and the £10 bursaries to be tenable for the same period, to enable the holders to receive another year's preparation at the schools.

XI. That the bursaries shall be determined by examination held in Edinburgh by the Society's Examiners.

XII. That a Standing Acting Committee of the Council on Agricultural Education shall be appointed by the Directors.

Note.—The list of Diploma Free Life Members was published in vol. xv.

* It has been resolved that, under ordinary circumstances, the examinations shall be held annually in the end of March or beginning of April, candidates being required to lodge intimation before the 10th of March.

† The £20 bursaries are not due till the holder presents himself for examination for the certificate or diploma.

The following have passed—

For First Class Certificate.

1867. J. C. Bowstead, M.R.A.C., Halkthorpe Hall, Penrith.
1868. James Taylor, Clashfarquhar, Aberdeen.
1873. R. C. B. Willis, M.R.A.C., Cheltenham.
1875. George H. Catt, 44 Middle Street, Brighton.
1875. Robert Ewing, Reporter, late Edinburgh.
1875. John Scott, Howford, Selkirk.
1876. Cecil C. Baker, 2 Bloomsbury Place, London.
1876. Percy H. Cathcart, 16 Oakley Square, London.
1876. John M'Caig, Kilhilt, Straaraer.
1876. C. E. M. Russell, Ballielisk, Dollar.
1878. W. M. Anderson, Pirntaton, Stow.
1879. Michael Falcon, Stainburn, Workington.
1880. William Brown, Watten Mains, Caithness.
1880. Alex. Inglis, Kenmore, Aberfeldy.
1880. James M'Laggan, Cobbleheugh, Dinnet, Aberdeenshire.
1880. R. A. Malloch, Balhaldie, Braco, Perthshire.
1881. Daniel Bain, Wick.
1881. Alfred Hardie, Oxford House, Stockport.
1882. Daniel Finlayson, Wick.
1882. Benjamin Hepburn, Preston Mains, Prestonkirk.
1882. James Rodger, Inchock, Arbroath.
1883. Walter de Houghton Birch, The Warren, Wootten-under-Edge.
1883. Alex. H. Gibson, Kirkcaldy.
1883. Arthur Herbert Kerr, Crookham, Farnham.
1883. Patrick L. Maitland, Perrymead House, Bath.
1883. John Malcolm, 60 Bath Row, Birmingham.
1883. Henry B. Mayne, Brantridge, Balcomb, Sussex.
1883. Robert Rouse Peter, 5 Ravelston Place, Edinburgh.

For Second Class Certificate.

1876. Andrew Catton, Couston, Aberdour, Fife.
1876. John Fleming, Coates, Penicuik.
1877. John T. T. Scoular, Edinburgh.
1877. Robert H. Wallace, Newton Hall, Windygates.
1878. James Gillespie, Halfmark, Corsock, Dalbeattie.
1878. James S. Innes, Edinburgh.
1879. Robert M. Traill, Hobbister, Orkney.
1880. Andrew Chapman, Breckonhill, Lockerbie.
1880. James Sutherland, Wick.
1880. William R. Tait, Wick.
1880. Francis Underwood, Sywell Hall, Northampton.
1881. John M. Little, jun., Bonnington House, Blackheath, London.
1881. Samuel Naismith, Edinburgh.
1881. John S. Peter, 5 Ravelston Place, Edinburgh.
1883. Herbert G. Aylen, Hazeldean Farm, St Albans.
1883. R. J. Campbell, Slagnaw, Castle Douglas.
1883. John K. Ledingham, Slap, Turriff.

SYLLABUS OF EXAMINATION

FOR CERTIFICATES AND DIPLOMA.

I.—SCIENCE AND PRACTICE OF AGRICULTURE.

1. Geological strata—surface geology—formation of soils—their classification—chemical and physical characters and composition—suitability for cultivation. 2. The principle of rotations—rotations suitable for different soils—systems of farming. 3. The composition of (*a*) manures—farm-yard and artificial—period and mode of application. The composition of (*b*) feeding substances—their suitability for different classes of farm stock—considerations affecting their use. 4. "How crops grow"—our farm crops—their cultivation—diseases—insect injuries and remedies—their chemical composition. The formation and management of plantations. 5. The principles on which drainage, irrigation, and warping operations should be based and carried out. The application of lime—marl—clay, &c. 6. Meteorology, or the laws of climate as affecting plant life—the influence of light and heat on cultivation—of absorption and retention of heat and

moisture—of porosity and capillarity in soils. 8. The breeding, rearing, feeding, and general treatment of farm stock—the different breeds of cattle and sheep—their characteristics—the districts where they are generally met with. 9. The machines and implements used in farming—their uses—and the principal points to be attended to in their construction. The "prime movers," or sources of power used in agriculture—man—horse—wind—water—steam—their relative values and advantages. *Text-books*—Morton's "Cyclopedia of Agriculture," Blackie & Son; "Our Farm Crops," Blackie and Son; "How Crops Grow," Macmillan and Co.; Roscoe's "Elementary Chemistry," Macmillan & Co.; Lindley's, Henfrey's, or Balfour's "Botany;" Page's "Geological Text-Book," Blackwood & Sons.

II.—BOTANY.

1. Nutritive Organs of Plants—root, stem, leaves. Functions of roots. Various kind of stem, with examples. Use of the stem. Structure of leaves. Different kinds of leaves. Arrangement and functions of leaves. 2. Reproductive Organs—Flower and its parts. Arrangements of the whorls of the flower—calyx, corola, stamens, pistil. Ovule. Mature pistil or fruit. Pruning and grafting. Seed. Young plant or embryo. Sprouting of the seed, or germination. 3. General Principles of Classification—meaning of the terms Class, Order, Genus, Species. Illustrations of natural orders taken from plants used in agricultural, such as grain-crops, grasses, clovers, vetches, turnips, mangold-wurzel, peas, beans, &c. Practical examination in fresh specimens and models; some of the latter may be seen in the Museum, at the Royal Botanic Garden, which is open daily to the public, free. *Text-book*—Balfour's "Elements of Botany," A. & C. Black, 1876, price 3s. 6d.

III.—CHEMISTRY.

The general principles of chemical combination. The chemistry of the more commonly occurring elements, and their more important compounds. The chemical processes concerned in agriculture generally. The changes which take place in the germination, growth, and maturation of plants, in the weathering and manuring of soils, &c. The composition and chemical character of the common mineral manures. *Text-books*—Roscoe's "Lessons in Elementary Chemistry," Macmillan & Co., London, price 4s. 6d. Johnston and Cameron's "Elements of Agricultural Chemistry and Geology." Johnson's "How Crop Grows," Macmillan & Co., London.

IV.—NATURAL HISTORY.

1. Zoology.

1. The Primary Divisions of the Animal Kingdom, with examples of each. 2. The Vertebrate Kingdom. The peculiarities and functions of the alimentary canal, distinguishing the Ruminants. 3. The orders—Hymenoptera, Diptera, and Coleoptera—with examples of insects injurious to farm crops belonging to each of the Orders—the preservation of birds which prey upon these insects, drawing a distinction between those which are beneficial and those which are destructive to crops. *Text-book*—Nicholson's "Introductory Text-Book of Zoology," William Blackwood & Sons, Edinburgh and London.

2. Geology.

4. The various strata forming the earth's crust in their order of deposition. 5. Their influence on the surface soils of the country. 6. The meaning and application of Disintegration, Drift, Alluvium, Dip, Strike, Fault. Page's "Introductory Text-Book of Geology," and Lyell's "Students' Elements of Geology."

V.—VETERINARY SCIENCE.

1. Anatomy of the Digestive organs of horse and ox, describing their structural differences. 2. The process of digestion in the above animals, and food most proper for each in quantity and quality. 3. The management of stock before, at, and after parturition. The time of utero-gestation in the domesticated animals. 4. The general principles to be followed in the treatment of very acute disease, before assistance of the veterinary surgeon can be procured.

VI.—FIELD ENGINEERING.

1. Land-Surveying with the Chain. 2. Mensuration of Areas of Land, in Imperial and Scotch acres, from a Chain Survey or from a Plan. 3. Levelling with the ordinary levelling instrument and staff, and calculating levels and gradients. *Text-books*—"Rudimentary Treatise on Land and Engineering Surveying," by T. Baker, C.E.; "Weales Series," price 2s., part I., chaps. 1, 2, 3, and 6, and part II. chap. 1, to be read.

VII.—BOOK-KEEPING.

1. Questions in Practice and Proportion. 2. Book-keeping—Describe books to be kept; give examples—taking of stock. *Text-book*—Stephen's "Practical System of Farm Book-keeping," Wm. Blackwood & Sons, Edinburgh, price 2s. 6d.

EXAMINATION FOR BURSARIES.

Candidates are examined in the Elements of Botany, Chemistry, Physical Geography, and Geology. *Text-books*—Balfour's "Elements of Botany;" Roscoe's "Lessons in Elementary Chemistry;" Page's "Introductory Text-Book of Geology;" Geikie's "Primer of Physical Geography;" and Lyell's "Students' Elements of Geology."

It has been resolved that, under ordinary circumstances, the examinations shall be held annually in the end of October, and candidates must enter their names with the Secretary before the 10th of that month, and produce the necessary certificates from the teachers of the schools they have attended.

The bursaries are open to candidates not less than fourteen years of age.

VETERINARY DEPARTMENT.

The Society established a Veterinary Department in 1823, but by an arrangement made with the Royal College of Veterinary Surgeons, the Society's examinations ceased in 1881. Holders of the Society's Veterinary Certificate are entitled to become Members of the Royal College of Veterinary Surgeons on payment of certain fees, without being required to undergo any further examination. The number of students who have passed for the Society's Certificate is 1183.

In 1874 the Society resolved to vote annually eight silver medals for Class Competition to each of the two Veterinary Colleges in Edinburgh, and to the one in Glasgow.

FORESTRY DEPARTMENT.

The Society grants First and Second Class Certificates in Forestry.

Board of Examiners.

1. *Science of Forestry and Practical Management of Woods.*—Dr Cleghorn of Stravithie, St Andrews ; John Macgregor, Ladywell, Dunkeld ; William M'Corquodale, Scone Palace, Perth ; J. Grant Thomson, Grantown, Strathspey.
2. *Elements of Botany.*—Dr Cleghorn.
3. *Nature and Properties of Soils, Drainage, and Effects of Climate.*—Professor Wilson.
4. *Land and Timber Measuring and Surveying ; Mechanics and Construction, as applied to Fencing, Drainage, Bridging, and Road-Making ; Implements of Forestry.*—A. W. Belfrage, C.E.
5. *Book-keeping and Accounts.*—John Turnbull Smith, C.A.

Candidates must possess—1*st*, A thorough acquaintance with the details of practical forestry. 2*d*, a general knowledge of the following branches of study, so far as these apply to forestry :—The Outlines of Botany ; the Nature and Properties of Soils, Drainage and Effects of Climate ; Land and Timber Measuring and Surveying ; Mechanics and Construction, as applied to fencing, draining, bridging, and road-making ; Implements of Forestry ; Book-keeping and Accounts. The examinations are open to candidates of any age.

The following have passed for First-Class Certificate :—

George Young Wall, M.R.A.C., Durham,	1870
William Baillie, Forester, Whitinghame, East Lothian,	1871
William Robertson, Forester's House, Lauder,	1871
Peter Loney, Marchmont, Duns,	1873
John M. Aitken, Ravenshill, Lockerbie,	1880
Richard Henderson, The Grange, Kirkcudbright,	1880
A. H. Gibson, Kirkcaldy,	1882
Alex. Inglis Kenmore, Aberfeldy,	1882

For Second Class Certificate :—

John M'Ewen, Yellow Cottage, Killin,	1880
Peter Reid, Waulkmilton, Linlithgow,	1883

SYLLABUS OF EXAMINATION.

1.—SCIENCE OF FORESTRY AND PRACTICAL MANAGEMENT OF WOODS.

1. Formation and ripening of Wood. Predisposing causes of decay. 2. Restoration of Wood-lands :—(1) Natural reproduction ; (2) Artificial planting, 3. General management of plantations. Cropping by rotation. Trees recommended for different situations. 4. Season and methods of pruning, thinning, and felling. 5. Circumstances unfavourable to the growth of trees. 6. Mechanical appliances for conveying and converting timber. Construction of saw-mills. 7. Qualities and uses of chief indigenous timbers. Processes of

preserving timber. 8. Management of nurseries. Seed-sowing. 9. Collection of forest produce. 10. Manufacture of tar and charcoal. 11. Insects injurious to trees—preservation of birds which prey upon them, drawing a distinction between birds which are beneficial and those which are destructive to trees.

II.—ELEMENTS OF BOTANY.

1. Nutritive Organs of Plants.—Root, stem, leaves. Functions of roots. Various kinds of stems, with examples. Use of the stem. Structure of leaves. Different kinds of leaves. Arrangement and functions of leaves. 2. Reproductive Organs.—Flower and its parts. Arrangement of the whorls of the flower—calyx, corolla, stamens, pistil. Ovule. Mature pistil or fruit. Pruning and grafting. Seed. Young plant or embryo. Sprouting of the seed or germination. 3. General Principles of Classification—Meaning of the terms Class, Order, Genus, Species. Illustrations taken from common forest trees and shrubs. Practical examination on fresh specimens and models, some of the latter may be seen in the Museum at the Royal Botanic Garden, which is open daily to the public free. Candidates may consult Professor Balfour's "Elements of Botany," published by A. & C. Black, Edinburgh. 1860, price 3s. 6d.

III.—NATURE AND PROPERTIES OF SOILS, DRAINAGE, AND EFFECTS OF CLIMATE.

1. The different descriptions of soils, their classification and suitability to growth of different descriptions of timber trees. 2. The composition and constituents of soils. The relations between the soil and trees growing on it. 3. The effects of drainage on soils and on climate. 4. The mode of drainage for plantations. 5. The influence of temperature, rainfall, aspect, shelter, and prevailing winds on tree life. 6. The methods of registering and recording observations, and the instruments used.

IV.—LAND AND TIMBER MEASURING AND SURVEYING; MECHANICS AND CONSTRUCTION AS APPLIED TO FENCING, BRIDGING, AND ROAD-MAKING: IMPLEMENTS OF FORESTRY.

1. The Use of the Level and Measuring Chain. Measuring and mapping surface areas. 2. The measurement of solid bodies—as timber, stacked bark, faggots, &c., earthwork. 3. The different modes of fencing and enclosing plantations; their relative advantages, durability, cost of construction, and repairs. 4. The setting out and formation of roads for temporary or permanent use. 5. The construction of bridges over streams and gullies; of gates or other entrances. 6. The different implements and tools used in planting, pruning, felling, barking, and working up timber trees, or preparing them for sale. Ewart's "Agricultural Assistant," Blackie & Son, Glasgow and Edinburgh, Price 3s. 6d. Strachan's "Agricultural Tables," Oliver & Boyd, Edinburgh, price 2s. 6d.

V.—BOOK-KEEPING AND ACCOUNTS.

1. Questions in Practice and Proportion. 2. Book-keeping—describe books to be kept; give examples. Taking of stock.

CHEMICAL DEPARTMENT.

Chemist to the Society—Dr A. P. AITKEN, Chemical Laboratory, 8 Clyde Street, Edinburgh.

The object of the Chemical Department is to carry on the Experiments at the Society's Agricultural Stations, and to consider all matters coming before the Society's notice in connection with the chemistry of agriculture.

The practical chemical work of the Society is under the charge of its Chemist, whose duties are—

1. To superintend the experiments being carried on at the experimental stations of the Society, to make all necessary analyses and investigations in connection therewith, and to prepare an annual report of these for publication in the *Transactions*.
2. To perform the requisite analyses in connection with such other experiments as are conducted under the sanction and direction of the Chemical Committee, and report on the same if desired.
3. To prepare a summary of all analyses for which the Society has contributed payment, and full details of such as appear to the Chemical Committee worthy of notice for publication in the *Transactions*.
4. To attend all meetings of the Chemical Committee of the Society.
5. To have a laboratory in Edinburgh, where he may be consulted by members of the Society.
6. To maintain a sufficient staff of assistants, one of whom at least is specially engaged in, and acquainted with, both the chemical and experimental work of the Society.
7. To prepare for publication in the Society's *Transactions* reports on the more important investigations and experiments being conducted in this country and elsewhere on the application of chemistry to agriculture.
8. To deliver lectures at such places and on such subjects connected with the chemistry of agriculture as are approved of by the Chemical Committee, and for which the chemist is permitted to receive remuneration from those applying for his services.

In order to encourage members, being practical farmers, to make experiments with different manures in the field, the Society undertake to defray the cost of making necessary analyses of soils, manures, and products for such experimentalists, provided they conduct their experiments under the direction or with the sanction of the Chemical Committee of the Society.

The chemist and his assistants are paid their travelling expenses when on the Society's work.

He receives a fee of £1, 1s. for each analysis made by him when employed as referee in connection with Local Associations.

He is entitled to charge for analyses made for members of the Society according to the following scale of fees :—

Manures,	£1 0 0
Feeding Stuffs,	1 0 0
Water, Sanitary Analysis,	1 0 0
,, Full Analysis,	5 0 0
Soil, Analytical Examination and Recommendation of Manures,	1 10 0
,, Full Analysis,	5 0 0
Vegetable Products, such as Hay, Turnips, Grain, &c.,	1 10 0
Partial Analysis, viz., one constituent,	0 10 0
Estimation of Nitrates or Potash in a manure,	0 10 0
Testing for Gross Adulteration,	0 5 0

INSTRUCTIONS FOR SELECTING SAMPLES FOR ANALYSIS.

MANURES.

Four or more bags are to be selected for sampling. Each bag is to be emptied out separately on a clean floor, worked through with the spade, and one spadeful taken out and set aside. The four or more spadefuls thus set aside are to be mixed together until a uniform mixture is obtained. Of this mixture one spadeful is to be taken, spread on paper, and still more thoroughly mixed, any lumps which it may contain being broken down with the hand. Of this mixture two samples of about a pound each shall be taken by the purchaser or his agent, in the presence of the seller or his agent or two witnesses, and these samples shall be taken as quickly as possible and put into bottles or tin cases to prevent loss of moisture, and having been labelled, shall be sealed by the samplers—one sample to be retained by the association, and the other to be sent to the chemist for analysis.

FEEDING STUFFS.

Samples of feeding compounds are to be taken in a similar manner.

Samples of cake are to be taken by selecting three cakes, breaking each across the middle, and from the broken part breaking off a small piece. The three pieces thus obtained shall be wrapped up and sealed by the samplers, and sent for analysis as in the case of manures, and three duplicate pieces similarly sealed shall be retained by the association.

SOILS.

Dig a little trench about two feet deep, exposing the soil and subsoil. Cut from the side of this trench a perpendicular section of the soil down to the top of the subsoil, and about four inches wide. Extract it carefully, and do not allow the subsoil to mix with it. A similar section of subsoil immediately below this sample should be taken and preserved separately. Five or six similarly drawn samples should be taken from different parts of the field, and kept separate while being sent to the chemist, that he may examine them individually before mixing in the laboratory.

VEGETABLE PRODUCTS.

Turnips, &c., 20 to 30 carefully selected as fair average bulbs.

Hay and straw must be sampled from a thin section cut across the whole stack, and carefully mixed about; about 20 lbs. weight is required for analysis.

Grain should be sampled like manures.

WATERS.

Samples of water for analysis should not be put into ordinary wine bottles or stoneware jars stopped with corks, as these usually vitiate the samples. Clear glass Winchester quarts with glass stoppers should be used.

Cases containing these, chemically cleaned, are forwarded from the laboratory on application.

Well water should be allowed to run for some time before the sample is drawn.

Standing water from cisterns, tanks, ponds, &c., should be sampled by immersing the bottle entirely under the water, and holding it, neck upwards, at least four inches below the surface.

Spring or stream water should be sampled in dry weather, by immersion, if possible, but if not deep enough for that purpose, a perfectly clean cup or glass should be used for transferring the water to the bottle.

While the bottle is being filled the stopper should either be held in the hand by the top or laid on a clean piece of paper.

Samples should be despatched to the laboratory *immediately* after being taken.

LOCAL ANALYTICAL ASSOCIATIONS.

1. With the view of encouraging, as well as regulating the conduct of, Local Analytical Associations, the Society contributes from its funds towards their expenses a sum not exceeding £250 annually.

II. The amount of such contribution is to each association at the rate of 10s. for each full analysis, and 5s. for each partial analysis of manure or feeding stuff effected, or such proportion thereof as the above annual contribution may permit of. The pecuniary assistance thus offered is subject to the following conditions being complied with to the satisfaction of the Chemical Committee :—

1. That the rules of the association are submitted to and approved of by the Chemical Committee.

2. That it is a condition of participating in the grant that the association make analyses for members of the Highland and Agricultural Society, being farmers and not members of the local association, charging them the cost price to the association, less the amount recovered from the Society.

3. That the association is managed by a committee of practical farmers owning or occupying land in the district.

4. That the analyst employed is of acknowledged standing.

5. That the benefits of the grant apply only to analyses made for farmers, and that these subscribe towards the expenses of the association, subject to the exception in No. 2.

6. That each analysis represents at least one ton of bulk actually purchased and delivered to one or more members under guarantee, or at a specified price per unit of valuable ingredients.

7. That the analysis has been made from a sample drawn after delivery, in accordance with the published instructions of the Society, and that a sealed duplicate sample has been retained.

8. That all analyses are reported according to forms furnished by the Highland and Agricultural Society, and that valuations of manures, if any are made, are calculated on a uniform standard to be issued periodically by the Society, and at least once a year.

III. (*a*) A general report regarding the analyses for which the Society has contributed payment is submitted to the general meeting in January, and full details concerning all manures and feeding stuffs whose analyses show any of the valuable constituents to be deficient to the extent of one-tenth of the amount guaranteed, or whose total deficiencies represent as much as one-tenth of the value of the manure or feeding stuff, are published annually in the *Transactions*.

(*b*) Before such publication is made, the seller must be communicated with, so that any explanation he has to offer may be obtained.

(*c*) In the case of every analysis showing the deficiency above described, the secretary of the association must lose no time in communicating with the seller, in order that no deterioration may take place in the duplicate sample, which must, as soon as possible, be forwarded to the Secretary of the Highland and Agricultural Society, along with any explanation received from the seller.

(*d*) Should the seller be dissatisfied with the results obtained by the analyst of the association, a further analysis may, at his option, be made from the duplicate sample by another analyst to be chosen by the Society, and at its cost, if the further analysis exonerates the seller, if otherwise, at the seller's cost.

IV. The report of each analysis for which a grant is claimed must be sent to the Secretary of the Highland and Agricultural Society on or before

the 1st November of each year, written on a schedule, containing the following particulars :—

Kind of manure or feeding stuff, and quantity purchased.
Names and addresses of seller and of buyer, and names of witnesses present at sampling.
Cash price per ton, or per unit, and value (if made) according to the Society's units of valuation.
Time and place of sampling.
Analysis guaranteed, and analysis found.

These schedules are supplied by the Secretary of the Society on application, and no grant is given for any analysis whose schedule is not accurately filled up.

The actual analytical reports of the association's analyst need not accompany the schedules, but must be forwarded if desired.

MANURES—THEIR COMPOSITION AND CHARACTERISTICS.

Nitrate of Soda.—A most valuable nitrogenous manure. Perfectly soluble, and immediately available for the nourishment of the plant. Feebly retained by the soil. Rapidly goes down to the subsoil, and improves its texture. Benefits deeply-rooting plants.

Good samples contain 95 per cent. or upwards of pure nitrate of soda. equivalent to about 19 per cent. of ammonia.

Five parts of nitrate of soda equal 1 of ammonia.

Sulphate of Ammonia.—A more concentrated nitrogenous manure than the preceding. Perfectly soluble, but not so rapid in its action as nitrate of soda. It is somewhat firmly retained by the soil, and not so liable as nitrate of soda to be washed out by heavy rains. It is therefore more suitable than nitrate for wet districts.

Good samples contain 93 per cent. or more of pure sulphate of ammonia, equivalent to from 24 to 25 per cent. of ammonia.

About four parts of sulphate of ammonia equal 1 of ammonia.

N.B.—Both nitrate of soda and sulphate of ammonia increase leaf and stem more than grain, and when applied to grass they check the growth of clover.

Dried Blood.—A nitrogenous manure, which differs from the above in being insoluble. It must be decomposed in the soil before it yields up its nitrogen to the plant, and this it does only slowly. The nitrogen is in the form of albumen, and is capable of yielding from 12 to 16 per cent. of ammonia.

Horn Dust.—An insoluble nitrogenous manure, capable of yielding 16 to 18 per cent. of ammonia. When in the form of fine sawdust, it decomposes easily, and is a good nitrogenous manure even for cereals.

Horn, when in the form of chips or coarse shavings, decomposes extremely slowly, and is not suitable for manure.

Shoddy or Wool Waste.—An insoluble nitrogenous material used by manure manufacturers as a source of ammonia in dissolved manures. It is capable of yielding from 5 to 10 per cent. of ammonia, but is unsuitable for direct application as a manure.

Leather.—A very insoluble nitrogenous material, yielding about 9 per cent. of ammonia, used by manure manufacturers, but possessing no interest for the farmer.

Peruvian Guano.—A general manure formed of the excrements of fish-eating birds, and containing nitrogenous compounds, phosphates, and potash.

High-class Peruvian guano is rich in nitrogenous matter, a large proportion of which is soluble. As now imported, it is capable of yielding from 8 to 12 per cent. ammonia, part of which is derived from ammonia salts, and part (less than 1 per cent.) from nitrates. Phosphates are low, seldom exceeding 30 per cent., but from one-quarter to one-half of the phosphates is soluble. The amount of potash is small, usually from 3 to 5 per cent.

Low-class Peruvian guano, as now imported, is poor in nitrogenous matter, yielding only from 3 to 5 per cent. ammonia. The phosphates are correspondingly high, viz., from 30 to 50 per cent., but the proportion of soluble phosphate is much smaller than in high-class Peruvian guano. Potash occurs to a very small extent, viz., about 1 to 3 per cent.

Low-class guanos are formed from high-class guanos, by the washing out of soluble constituents by rain, &c., and their composition varies greatly according to the amount of washing they have undergone.

Genuine Peruvian guano frequently contains a large proportion of stony insoluble matter.

Ichaboe Guano.—A general manure, but of recent formation. It is very rich in nitrogenous matter, which yields from 10 to 16 per cent. of ammonia, but a large part of the nitrogenous matter is in the form of feathers, which are insoluble and of low manurial value.

The total phosphates vary from 18 to 30 per cent., of which from a fourth to a half is usually soluble. There is seldom more than 2 per cent. potash present.

Fish Guano.—Derived from fish-curing yards, and consisting of the heads and offal of fish, dried and ground. Properly speaking, it is not a guano. The name guano is properly applied only to the dung of birds.

High-class fish guano contains nitrogenous matter, yielding from 10 to 12 per cent. of ammonia, but it is in the form of insoluble albuminous compounds, which only very slowly decompose and become available as plant food. The phosphates range from 18 to 30 per cent., and are all insoluble.

Low-class fish guanos are substances like the preceding, but containing less nitrogenous matter and more phosphates. They are simply bone manures, with somewhat more ammonia and less phosphate than ordinary bone meal, and having no real resemblance to a guano.

Fish guanos are usually impregnated with fish oil, which detracts from the value of the manure. The oil varies from 3 to 10 per cent.

Fray Bentos Guano.—The dried and ground residue and débris of animals after the extraction of "Liebig's Extract." It is not a guano. It contains nitrogenous matter and phosphates, both of which are insoluble and slow in their action as manures. It varies in composition, yielding from 6 to 12 per cent. ammonia, from 16 to 35 per cent. phosphates, and a small proportion of potash.

Bone Meal.—Chiefly a phosphatic manure, but containing also nitrogenous matter. Phosphates range from 44 to 53 per cent. according to the purity of the bones, and are insoluble. The nitrogenous matter is capable of yielding from 4 to 5 per cent. ammonia, and is also insoluble. There is usually 3 per cent. or more of oil in bones, and this retards its action as a manure. The finer ground it is the more speedy is its action.

Bone Dust.—A coarser ground bone than the preceding.

Crushed Bones.—Still coarser ground.

Steamed Bone Flour.—Bones which have been subjected to steam at high pressure for the extraction of glue or gelatnie. The residue contains from 56 to 65 per cent. phosphates and from 1 to 2 per cent. ammonia. It is white coloured and friable, and can be crushed with the hand. It is able

to be, and ought to be, ground to a fine flour. Owing to this latter character, it is the most active form of bone manure.

Pure Dissolved Bones.—Bones dissolved in sulphuric acid and dried with bone ash or bone char, or other bone material. It contains usually less than 20 per cent. soluble phosphate, about 10 per cent. or upwards of insoluble phosphate, and yields from 2½ to 3½ per cent. ammonia.

Dissolved Bones.—A conventional name applied to compound manures consisting of any kind of mixture of phosphatic and nitrogenous materials which can be dissolved, with (or without) an admixture of bone, so as to produce a manure containing from 15 to 30 per cent. soluble phosphates, and from 1 to 3 per cent. ammonia.

Vitriolated Bones.—Bones which have been moistened with sulphuric acid, and thereafter allowed to heat in large heaps for a long time. Good samples contain from 6 to 12 per cent. soluble phosphate, with from 30 to 40 per cent. insoluble phosphate, and yield from 3 to 4 per cent. ammonia.

Superphosphates.—Phosphates dissolved with sulphuric acid. Their composition varies according to the richness of the phosphate from which they are made, and the extent to which they have been dissolved.

High-class Superphosphates are made from phosphates containing a high percentage of phosphate of lime, and are very thoroughly dissolved. They should contain between 30 and 40 per cent. soluble phosphate, and very little insoluble phosphate.

Medium Superphosphates contain at least 23 per cent. soluble phosphate, and all below that are

Low-class Superphosphates made from minerals poor in phosphate of lime, or insufficiently dissolved.

Mineral Phosphates exist in great variety, and contain very various proportions of phosphate of lime, viz., from 20 to 90 per cent. They are of use as manures only when they are ground to the finest flour. Even when ground very finely, some are so hard and insoluble as to be of no use as manures.

Compound Manures.—These are general manures containing nitrogenous matter, phosphates, and potash, and their value depends not only on the amounts of these constituents, but also on their fineness of division, their solubility, and the sources from which their ingredients are derived.

The general character of a few of the more common of these may be indicated thus :—

Turnip Compounds.—These usually contain from 25 to 35 per cent. phosphates, of which the half or more is soluble, and nitrogenous matter, capable of yielding from 2 to 4 per cent. of ammonia, and sometimes 1 or 2 per cent. of potash.

Potato Compounds.—These are somewhat like the preceding, but contain usually less phosphate and a little more ammonia, from 3 to 6 per cent.; sometimes they contain no potash, but more frequently about 3 or 4 per cent. is present, and in some instances twice as much.

Bean Compounds.—These may contain from 10 to 20 per cent. phosphates, nitrogenous matter yielding from 3 to 7 per cent. of ammonia, and usually a considerable proportion of potash, often as much as from 10 to 15 per cent.

Cereal Compounds.—These usually contain about 20 per cent. phosphates, mostly soluble, and nitrogenous matter, yielding from 3 to 6 per cent. ammonia, and seldom contain potash.

Grass Compounds.—These are somewhat like the preceding, but may contain less phosphates and more nitrogen, part of which may be in the form of nitrate.

RELATIVE ACTIVITY OF MANURES.

Nitrogen.—Most active in—1st, Nitrates; 2nd, Ammonia salts; 3rd, High-class Peruvian and Ichaboe guanos; 4th, High-class dissolved compounds; 5th, Dried blood; 6th, Steamed bone flour; 7th, Fish guano and fine bone meal; 8th, Rape cake and cotton cake dust; 9th, Bone dust and crushed bones.

Phosphates.—Most active in—1st, Superphosphates and dissolved phosphates derived from any source; 2nd, Precipitated and reverted phosphates: 3rd, Steamed bone flour; 4th, Bone ash; 5th Charleston and similar phosphates ground to the finest flour; 6th, Bone meal and fish guano; 7th, Bone dust and crushed bones.

HINTS ON THE APPLICATION OF MANURES.

Nitrogenous Manures.

Nitrate of Soda.—Apply as a top-dressing to the braird. Showery weather advantageous. Heavy rains cause loss. Two half doses with fortnight interval better than one whole dose. Increases straw more than grain. Increases grass, diminishes clover.

Sulphate of Ammonia.—Apply as top-dressing after sowing, not after brairding. Increases grass, diminishes clover. More suitable than nitrate for wet districts.

High Class Guanos.—Apply with the seed, or partly as top dressing. Useful for young grass and early potatoes.

Dissolved Compounds.—Apply with the seed.

Dried Blood.—Apply a month or more before sowing, if possible. If applied with the seed, useful for root-crops only.

Fish Guano.—Best on warm, open land, and in moist climates. Apply as early as possible. Should not contain more than 3 per cent. oil.

Leather and Shoddy.—Of no value to the farmer.

Phosphatic Manures.

Superphosphate.—Best phosphate for clayey soils. Suits medium soils. Makes early crop, therefore good for late districts. Increases grain more than straw.

Precipitated Phosphate.—Best on medium and light land.

Steamed Bone Flour.—Should be finely ground and applied early. Best on light soils or on moorland. Suits wet climates. Excellent improver of pastures. Quicker than bone meal in its action.

Bone Ash.—Generally applicable. Best on light land.

Bone Meal.—Should be as fine as possible, and applied early. Best on light, free soils, and on sandy soils.

Mineral Phosphate.—Must be ground to the finest flour, and feel soft and chalky. Best on moorland and land rich in organic matter. Should be applied very early.

Bone Dust and Crushed Bones.—More suitable for vine borders than for agricultural purposes.

Phosphatic Manures.—When applied alone, frequently fail to give a full crop. Some nitrogenous manure ought as a rule to be mixed with them, or applied later as a top-dressing.

POTASSIC MANURES.—Useful where potatoes or beans are grown, or where straw is sold. Increases clover. Seldom required where much dung is used. Sometimes injurious if applied with the seed. Should be applied very early.

LIME.—Better slaked in large heap, and then carted on and spread, than slaked in small heaps on land. Better two small limings than one big one. Best results on clayey land and moorland. As a preventive of finger-and-toe, lime is better applied to the lea before the oat crop than to the stubble. It is of little use for that purpose when applied to the fallow immediately before turnip sowing.

NOTES REGARDING ANALYSES.

I. MANURES.

The three ingredients of greatest importance in manures are phosphoric acid, nitrogen, and potash.

1. PHOSPHORIC ACID is present in manures as such, and also as phosphates of lime, magnesia, iron, and alumina.

Phosphate of Lime is most important, and exists in two states, insoluble and soluble.

Insoluble—

Insoluble phosphate of lime, called also Tricalcic phosphate, and Tribasic phosphate of lime, } contains about 46% phosphoric acid.

Soluble—

Soluble phosphate of lime, called also Acid phosphate of lime, and *erroneously* Monabasic phosphate of lime, } contains about 61% phosphoric acid.

Some analysts prefer to state the soluble phosphate as Biphosphate of lime, called also Monobasic phosphate, } contains about 72% phosphoric acid.

The soluble phosphates are usually stated as equivalent to so much tricalcic or insoluble phosphate.

Soluble phosphate, multiplied by 1⅓ } gives the equivalent of tricalcic phosphate nearly.
Biphosphate, „ „ 1½ }

Much confusion has arisen from the various methods of stating soluble phosphate. To escape from this confusion, it has now become the custom to consider the term "soluble phosphate" *to mean* "phosphate of lime rendered soluble." *In other words, soluble phosphate means the insoluble phosphate from which it was derived.*

Phosphate of magnesia occurs in small quantity in bones, &c., and is usually reckoned as tricalcic phosphate.

Phosphates of iron and alumina, when occurring in *small quantity*, are usually reckoned as tricalcic phosphate, but if the quantity is considerable it should be separately estimated.

2. NITROGEN occurs in manures mostly in three forms—Ammonia salts, nitrates, and albuminoid matter.

Ammonia sulphate (pure), contains 25¾% ammonia.
Ammonium chloride (pure), „ 31¾ „
Nitrate of soda (pure), contains nitrogen equal to 20% ammonia.
Albuminoid matter contains about 16% nitrogen, equal to about 19% ammonia, most of which sooner or later becomes available as plant food.

3. Potash is found in small amount in most manures, and should be reckoned as anhydrous potash (K_2O).
Sulphate of potash (pure), contains potassium = 54% anhydrous potash.
Muriate of potash (pure), contains potassium = fully 63% anhydrous potash.

II. FEEDING STUFFS.

These are chiefly concentrated forms of food, whose value depends on the amounts they contain of albuminoids, oil, and carbohydrates.

Albuminoids are compounds containing nitrogen, and more or less resemble dry flesh in their composition. They are sometimes called *flesh-formers.* They are the most valuable constituents of feeding stuffs. The percentage of nitrogen contained in a cake multiplied by $6\frac{1}{4}$ gives the percentage of albuminoids.

Oils occur chiefly in seeds, and are of various kinds. Some are highly nutritious.

Carbohydrates are compounds, such as sugar, starch, gum, and cellulose. These are sometimes called *heat-producers.*

Woody fibre is the name given to that part of the cellulose which is insoluble when boiled in weak solutions (5%) of acids and alkalies, and is therefore considered indigestible.

Good linseed, cotton, and rape cakes should contain from 4% to 5% nitrogen, about 10% oil, and about 6% ash.

Useful Factors.

Amount of	Multiplied by	Gives corresponding amount of
Nitrogen,	1·214	Ammonia.
„	6·3	Albuminoid matter.
Ammonia,	3·882	Sulphate of Ammonia.
„	3·147	Muriate of Ammonia.
„	3·706	Nitric Acid.
„	5·0	Nitrate of Soda.
Potash (anhydrous),	1·85	Sulphate of Potash.
„	1·585	Muriate of Potash.
Phosphoric acid (anhydrous),	2·183	*Phosphate of Lime.
„ „	1·4	Biphosphate.
„ „	1·648	Soluble Phosphate (monocalcic tribasic).
Soluble Phosphate,†	1·325	Phosphate of Lime.
Biphosphate,	1·566	Phosphate of Lime.
Lime,	1·845	Phosphate of Lime.
„	1·786	Carbonate of Lime.

* By phosphate of lime is meant tricalcic phosphate ($3CaO, P_2O_5$).
† Monocalcic tribasic phosphate ($CaO, 2H_2O, P_2O_5$).

The following are the forms in which analyses of *ordinary genuine* manures and feeding stuffs must be reported by Local Analytical Associations receiving the Society's grant:—

I. Reports of Analyses of *MANURES.*

(On the one side are the analytical details, and on the other the valuable constituents which alone are considered in estimating the value of manure.)

1. Form of Analysis for Superphosphates, Dissolved Bones, and the like.

Analytical details.		*Capable of yielding the following* Valuable Constituents.		
Phosphoric Acid, in a soluble state,	.....	Phosphate of Lime, dissolved,	.....	.....
Do., in an insoluble state,	.....			
Lime,	.....	Do. undissolved,	.....	
Sulphuric Acid, Organic matter, &c.,	.....	Ammonia,	.....	
Sand and insoluble matter,	.....			

2. Form of Analysis for Bones, Bone Meal, Fish Guano, and the like.

Analytical details.		*Capable of yielding the following* Valuable Constituents.	
Phosphoric Acid,	.....	Phosphate of Lime, undissolved	.....
Lime,	.....		
Alkalies, &c.,	.....		
Organic matter,	.....	Ammonia,	.....
Moisture,	.....		
Sand and insoluble matter,	.....		

3. Form of Analysis for Mixed Manures, Peruvian and Ichaboe Guanos, and the like.

Analytical details.		*Capable of yielding the following* Valuable Constituents.		
Phosphoric Acid, in a soluble state,	.....	Phosphate of Lime, dissolved,	.....	.....
Do., in an insoluble state,	.....			
Lime,	.....	Do., undissolved,	.....	
Alkalies, &c.,	.....	*Potash,	.....	
		*Nitrates = Ammonia,	.....	
Organic matter and Ammonia Salts,	.....	Ammonia,	.....	.....
Moisture,	.....			
Sand and insoluble matter,	.....			

II. Reports of Analyses of *FEEDING STUFFS.*

Valuable Constituents,	Albuminoid compounds,	.....
	Oil,	.....
	Carbohydrates,	.....
	Woody Fibre,	.....
	Moisture,	.....
	Ash,	.....
	Nitrogen,	.....

* Estimated only if requested.

UNITS TO BE USED IN THE VALUATION OF MANURES,

By which the COMMERCIAL values of manures may be approximately determined on strictly CASH PRICES at sea-ports, bags not included.
For Season 1884.

Classes	Ammoniacal Guanos Genuine as Imported.		Fish Manures.		Dissolved Manures and Compound Manures.				Superphosphates.			Steamed Bone Flour.		Bones.			Ground Mineral Phosphates.		Sulphate of Ammonia.	Nitrate of Soda.
	a.	*b.*	*a.*	*b.*	*a.*	*b.*	*c.*	*d.*	*a.*	*b.*	*c.*	*a.*	*b.*	*a.*	*b.*	*c.*	*a.*	*b.*		
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Phosphates dissolved,	3 6	3 6	...	...	3 6	3 6	3 6	3 6	3 0	2 9	2 9	...	...	...	...	...	...	...	...	...
,, undissolved,	2 6	2 3	2 6	2 3	2 5	2 2	1 9	1 3	1 9	1 6	1 3	2 6	2 3	2 6	2 5	2 3	1 10	1 6	...	...
Ammonia,	19 6	18 6	17 0	16 0	13 0	12 0	11 0	11 0	...	...	...	12 0	12 0	12 0	11 0	11 0	...	...	12 0*	11 0*
Potash,	4 0	4 0	...	...	4 0	4 0	4 0	4 0	...	...	...	...	...	...	...	...	...	...	...	...

* Present market prices. These usually vary so much during the season that the values here given are only for use in the case of mixed manures.

CLASSIFICATION OF MANURES,

Showing how the above classes are to be determined, a margin being allowed of 2 units total phosphates; also of one-half unit ammonia in manures found to contain not less than 5 per cent. ammonia, and of one quarter unit ammonia in manures found to contain less than 5 per cent., but not less than 2 per cent. ammonia.

	Class.	Amount of Phosphates		Amount of Ammonia.		Regarding Fineness, &c.
				Per cent.		
Ammoniacal Guanos Genuine as Imported,	*a.*	...		6 or over.		
	b.	...		Under 6.		
Fish Manures (including so-called Fish Guano),	*a.*	...		6 or over,	and	not containing more than 5 per cent. oil.
	b.	...		Under 6,	or	containing more than 5 per cent. oil.
Dissolved Manures and Compound Manures,	*a.*	The half of total dissolved,	and	6 or over,	and	not containing more than 2 per cent. material that will not pass ¼ inch sieve.
	b.	Less than the half of total dissolved,	or	3 or over,	and	not containing more than 4 per cent. do.
	c.	Containing not less than 25 per cent. total,	and	1.75 or over,	and	not containing more than 8 per cent. do.
	d.	,, less than 25 per cent.,	or	Under 1.75,	or	containing more than 8 per cent. do.
Superphosphates,	*a.*	Containing not less than 35 per cent. dissolved.		...		
	b.	,, not less than 25 per cent. dissolved.		...		
	c.	,, less than 25 per cent. dissolved.		...		
Bones,	*a.*	Containing not less than 45 per cent.,	and	4 or over,	and	90 per cent. passing through ½ inch sieve.
	b.	,, ,, ,,	and	4 or over,	and	,, passing through ¼ inch sieve.
	c.	Containing less than 45 per cent.,	or	Under 4,	or	less finely ground.
Steamed Bone Flour,	*a.*	Containing not less than 55 per cent.,	and	1.5,	and	90 per cent. in state of actual flour.
	b.	,, less than 55 per cent.,	or	Under 1.5,	or	less finely ground.
Ground Mineral Phosphates,	*a.*	...		...		80 per cent. passing through No. 80 wirecloth.
	b.	...		...		less finely ground.

The above units do not represent agricultural values, but are based upon the present commercial prices, viz., STRICTLY CASH PRICES at sea-ports. They are intended for the use of the members of the Highland and Agricultural Society, to enable them to determine approximately from the results of analysis what is the market price of a manure, and are alone to be used in valuing manures for Local Analytical Associations who desire to receive the Society's grant.

LOCAL ANALYTICAL ASSOCIATIONS WHO HAVE RECEIVED THE SOCIETY'S GRANTS.

	County.	Name of Association.	Name and Address of Secretary.	Number of Analyses.			Grants obtained.		
				1881.	1882.	1883.	1881.	1882.	1883.
							£ s. d.	£ s. d.	£ s. d.
1	Aberdeen, . .	Alford Analytical Association, .	Charles M'Connach, Cairnballoch, Alford,	.	13	11	.	3 5 0	2 15 0
2	,, . .	Buchan Farmers' Analytical Association,	Thomas Forrest, Mains of Ludquharn, Longside,	21	17	.	5 5 0	4 5 0	.
3	Caithness, . .	Caithness Farmers' Analytical Association,	George Brown, Watten Mains, Caithness,	17	18	.	4 5 0	4 10 0	.
4	Dumfries, . .	Annandale Farmers' Club, . .	John Baird, jun., and John A. Mackenzie, Lockerbie,	.	13	27	.	3 5 0	6 0 0
5	Edinburgh, . .	Dalkeith Analytical Association, .	William Harper, Sheriffhall Mains, Dalkeith,	.	.	2	.	.	0 10 0
6	Forfar, . . .	Arbroath Analytical Association, .	Donald Falconer, Carmyllie, Arbroath.	15	.	14	3 15 0	.	3 10 0
7	,, . . .	Carse of Gowrie Farmers' Analytical Association,	Alexander Anderson, Berryhill, Dundee,	8	.	4	2 0 0	.	0 17 6
8	Inverness, . .	Inverness, Nairn, and Black Isle Analytical Association,	William Ross, Brecknish, Culloden,	24	20	.	6 0 0	5 0 0	.
9	Kincardine, . .	Kincardineshire Farmers' Club .	A. B. Annandale, Stonehaven,	9	7	.	2 5 0	1 15 0	.
10	Lanark, . . .	Lanarkshire Analytical Association,	James Lindsay, Eastfield, Thankerton,	24	25	18	5 17 6	5 17 6	4 2 6
11	Orkney, . . .	Orkney Agricultural Society, . .	James Johnston, jun., Hall of Tanerness, Kirkwall,	8	9	.	2 0 0	2 5 0	.
12	Perth, . . .	Strathearn Analytical Association,	James Patterson, Henhill, Forteviot,	27	28	22	6 15 0	6 10 0	5 2 6
13	Ross, . . .	Easter Ross ,, ,,	John Gordon, Balmuchy, Fearn,	17	12	10	4 5 0	3 0 0	2 10 0
14	,, . . .	Wester Ross ,, ,,	Walter Arras, Fodderty Lodge, Dingwall,	22	6	11	5 10 0	1 10 0	2 15 0
15	Roxburgh, . .	Kelso Analytical Association, .	T. Balmer Dove, Kelso,	27	34	24	6 5 0	7 17 6	5 7 6
16	Stirling, . . .	Menteith Private Analytical Association,	John Murray, Munnieston, Thornhill, Stirling,	2	.	.	0 7 6	.	.
				221	202	143	£54 10 0	£49 0 0	£33 10 0

PREMIUMS.

GENERAL REGULATIONS FOR COMPETITORS.

All reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in competition; they must bear a distinguishing motto, and be accompanied by a sealed letter similarly marked, containing the name and address of the Reporter—initials must not be used.

No sealed letter, unless belonging to a Report found entitled to at least one-half of the premiums offered, will be opened without the author's consent.

Reports for which a Premium, or one-half of it, has been awarded, become the property of the Society, and cannot be published in whole or in part, nor circulated in any manner, without the consent of the Directors. All other papers will be returned to the authors, if applied for within twelve months.

When a Report is unsatisfactory, the Society is not bound to award the whole or any part of a premium.

All Reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each Premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded. Weights and measurements must be indicated by the Imperial standards.

The Directors, before awarding a Premium, shall have power to require the writer of any report to verify the statements made in it.

The decisions of the Board of Directors are final and conclusive as to all premiums, whether for Reports or at General or District Shows; and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

The Directors will welcome papers from any Contributor on any suitable subject not included in the Premium List; and if the topic and the treatment of it are both approved, the Writer will be remunerated, and his paper published.

CLASS I.

REPORTS.

Section 1.—THE SCIENCE AND PRACTICE OF AGRICULTURE.

FOR APPROVED REPORTS.

1. On the Agriculture of the County of Dumbarton—Twenty Sovereigns. To be lodged by 1st November 1884.

The Report should embrace full details of the different systems of Farm Management observed in the County, and of the progress which Agriculture and other industries have made within the last 25 years.

2. On the Agriculture of the County of Renfrew—Twenty-five Sovereigns. To be lodged by 1st November 1885.

The Report should embrace full details of the different systems of Farm Management observed in the County, and of the progress which Agriculture and other industries have made within the last 25 years.

3. On the Agriculture of the County of Selkirk—Twenty-five Sovereigns. To be lodged by 1st November 1885.

The Report should embrace full details of the different systems of Farm Management observed in the County, and of the progress which Agriculture and other industries have made within the last 25 years.

4. On the results of experiments for fixing and retaining the volatile and soluble ingredients in farm-yard manure—Twenty Sovereigns. To be lodged by 1st November in any year.

The Report must detail the treatment adopted to fix and retain these ingredients—the materials used for that purpose—and the quantity and cost thereof—comparative analyses of the manure with and without the treatment, and also a statement of the crops grown with manure and without such treatment, must be given by the Reporter. The experiments to have extended over at least two years and crops.

5. On the results of experiments for ascertaining the comparative value of farm-yard manure obtained from cattle fed upon different varieties of food, by the application of such manures to farm crops—Twenty Sovereigns. To be lodged by 1st November in any year.

The Report must state the effects produced on two successive crops by the application of manure obtained from cattle fed on different sorts of food, such as turnips and straw alone; and turnips and straw, with an addition of oil-cake, linseed, bean-meal, grain or other substances. The animals should be as nearly as possible of the same age, weight, condition, and maturity, and each lot should receive daily the same quantity of litter; and except as to the difference of food, they must be treated alike.

The preparation of the manure, by fermentation or otherwise, should be in every respect the same; and it is desirable that not less than two several experiments be made with each kind, and that the ground to which it is to be applied be as equal as possible in quality and condition.

6. On the means successfully employed for obtaining new Aricultural Plants, or new and superior varieties, or improved sub-varieties, of any of the cereal grains, grasses, roots, or other agricultural plants at present cultivated in this country—Medals, or sums of Money not exceeding Fifty Sovereigns. To be lodged by 1st November in any year.

It is necessary that the varieties and sub-varieties reported upon shall have been proved capable of reproduction from seed, and also that the relation they bear to others, or well known sorts, should be stated. The Reporter is further requested to mention the effects that he may have observed produced by different soils, manures, &c., on the plants forming the subject of report, and how far he may have ascertained such effects to be lasting.

Should any improved variety reported upon be the result of direct experiment by cross impregnation, involving expense and long-continued attention, a higher premium will be awarded.

7. On the hardy and useful Herbaceous Plants of any country where such climate exists as to induce the belief that the plants may be beneficially introduced into the cultivation of Scotland —The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

Attention is particularly directed to the Grains and Grasses of China, Japan, the Islands of the Eastern Archipelago, the Himalaya country, the Falkland and South Sea Islands, California, and the high north-western district of America.

Reporters are required to give the generic and specific names of the plants treated of, with the authority for the same—together with the native names, so far as known; and to state the elevation of the locality and nature of the soil in which they are cultivated, or which they naturally inhabit, with their qualities or uses; and it is further requested that the descriptions be accompanied, in so far as possible, with specimens of the plants, and their fruit, seed, and other products.

8. On the comparative advantages of fattening Cattle in stalls, in loose houses or boxes, and in sheds or hammels—Twenty Sovereigns. To be lodged by 1st November in any year.

The Report must detail the comparative result of actual experiments. The same quantities and kinds of food must be used. Information is required as to the comparative expense of attendance, the cost of erecting the buildings, and any other circumstance deserving of attention. The state of the weather during the experiment, in point of temperature and wetness, and the advantages or disadvantages of clipping cattle put up to feed, must be particularly noted and reported.

9. On experiments for ascertaining the actual addition of weight to growing or fattening Stock, by the use of different kinds of food—Twenty Sovereigns. To be lodged by 1st November in any year.

The attention of the Experimenter is directed to turnips, carrots, beet, mangold-wurzel, potatoes, cabbage, as well as to beans, oats, barley, Indian corn, linseed, oil-cake or rape-cake, and to the effect of warmth and proper ventilation, and the difference between food cooked and raw. The above roots and other kinds of food are merely suggested; competitors are neither restricted to them nor obliged to experiment on all of them.

When experiments are made with linseed and cake, attention should be paid to the comparative advantages, economically and otherwise, of the substance in these two states.

Before commencing the comparative experiments, the animals must be fed alike for some time previously.

The progress of different breeds may be compared. This will form an interesting experiment of itself, for Reports of which encouragement will be given.

N.B.—The experiments specified in the two previous subjects must be conducted over a period of not less than three months. No lot shall consist of fewer than four Cattle or ten Sheep. The animals selected should be of the same age, sex, and breed, and, as nearly as possible, of the same weight, condition, and maturity. The live weight before and after the experiment must be stated, and, if killed, their dead weight and quantity of tallow.

10. On the Comparative Feeding Value of Ensilage with other ordinary Farm produce—Fifteen Sovereigns. To be lodged by 1st February 1885.

11. On the influence of Soil and Geological Formation in the production of Disease in Animals—Ten Sovereigns. To be lodged by 1st November 1884.

12. On the improvement of Hill Pasture without breaking up—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November 1884.

The writer to detail the results of practical experiments carried on by himself or others.

13. On any useful practice in Rural Economy adopted in other countries, and susceptible of being introduced with advantage into Scotland—The Gold Medal. To be lodged by 1st November in any year.

The purposes chiefly contemplated by the offer of this premium is to induce travellers to notice and record such particular practices as may seem calculated to benefit Scotland. The Report to be founded on personal observation.

Section 2.—ESTATE IMPROVEMENTS.

FOR APPROVED REPORTS.

1. By the Proprietor in Scotland who shall have executed the most judicious, successful, and extensive improvement.—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

Should the successful Report be written for the Proprietor by his resident factor or farm manager, a Minor Gold Medal will be awarded to the writer in addition to the Gold Medal to the Proprietor.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

2. By the Proprietor in Scotland who shall have erected on his estate the most approved Farm-buildings—The Gold Medal. Reports, Plans, and Specifications to be lodged by 1st November in any year.

3. By the Proprietor or Tenant in Scotland who shall have reclaimed within the ten preceding years not less than forty acres of waste land—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

4. By the Tenant in Scotland who shall have reclaimed within the ten preceding years not less than twenty acres of waste land —The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

5. By the Tenant in Scotland who shall have reclaimed not less than ten acres within a similar period—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The Reports in competition for Nos. 3, 4, and 5 may comprehend such general observations on the improvement of waste lands as the writer's experience may lead him to make, but must refer especially to the lands reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot be made up of different patches of land, the improvement must have relation to one subject; it must be of a profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return* and a certified measurement of the ground are requisite.

6. By the Proprietor or Tenant in Scotland who shall have improved within the ten preceding years the pasturage of not

less than thirty acres, by means of top-dressing, draining, or otherwise, without tillage, in situations where tillage may be inexpedient—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

7. By the Tenant in Scotland who shall have improved not less than ten acres within a similar period—The Minor Gold Medal. To be lodged by 1st November in any year.

Reports in competition for Nos. 6 and 7 must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

Section 3.—HIGHLAND INDUSTRIES AND FISHERIES.

FOR APPROVED REPORTS.

1. On the Best Means of Developing the Oyster Fisheries of Scotland—Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November 1884.

2. On the Best Means of Developing the Eel Fishing of Scotland, and of conveying the Fish to English Markets—Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November 1884.

3. On the Best Mode of Utilising Fish Products or Offal of Scotland—Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November 1884.

Section 4.—MACHINERY.

FOR APPROVED REPORTS.

1. On the best and most improved Cattle Truck for feeding and watering the animals in transit—Twenty Sovereigns. To be lodged by 1st November 1884.

Reports must be accompanied with drawings and description, or, if necessary, by a model.

2. On the best and most improved Truck for conveying Dead Meats, Fish, &c., from long distances in hot weather—Twenty Sovereigns. To be lodged by 1st November 1884.

Reports must be accompanied with drawings and description, or, if necessary, by a model.

Section 5.—FORESTRY DEPARTMENT.

FOR APPROVED REPORTS.

1. By the Proprietor in Scotland who shall, within the five preceding years, have planted not less than 150 acres—The Gold Medal. To be lodged by 1st November in any year.

The whole planting operations which may have been conducted by the Reporter within the five years, whether completed or not, must be embraced, and he must state the expense—description or soils—age, kind, and number of trees planted per acre—mode of planting, draining, and fencing—general state of the plantation—and any other observations of interest.

2. On Plantations of not less than eight years' standing, formed on deep peat bog—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November 1884.

The premium is strictly applicable to deep peat or flow moss; the condition of the moss previous to planting, as well as at the date of the Report, should, if possible, be stated.

The Report must describe the mode and extent of the drainage, and the effect it has had in subsiding the moss—the trenching, levelling, or other preliminary operations that may have been performed on the surface—the mode of planting—kinds, sizes, and numbers of trees planted per acre—and their relative progress and value, as compared with plantations of a similar age and description grown on other soils in the vicinity.

3. On the more extended introduction of hardy, useful, or ornamental Trees, which have not hitherto been generally cultivated in Scotland—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The Report should specify as distinctly as possible the kind of trees introduced. The adaptation of the trees for use or ornament, and their comparative progress, should be mentioned. Attention is directed to the introduction of any tree as a nurse in young plantations, which by growing rapidly for several years, and attaining maturity when at the height of 20 or 25 feet, might realise the advantage and avoid the evils of thick planting.

4. On the varieties of Trees best adapted for planting as shelter in the Islands of Scotland—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November 1884.

5. On the old and remarkable Cedars of Lebanon in Scotland—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November 1884.

Details of their growth, measurements, and condition, and any particulars of their history, must be given. The measurements to be taken by the Reporter himself, and at 5 feet from the ground, if possible. Photographs and drawings are desirable.

6. On the old and remarkable English Yews in Scotland—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November 1884.

Details of their growth, measurements, and condition, and any particulars of their history, must be given. The measurements to be taken by the Reporter himself, and at 5 feet from the ground, if possible. Photographs and drawings are desirable.

7. On the Woods, Forests, and Forestry in the county of Perth—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November 1884.

8. On the Woods, Forests, and Forestry in the county of Inverness—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November 1884.

9. On the utilisation of waste produce of Forests and Woodlands—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November 1884.

10. On the Insects most injurious to Forest Trees, and the diseases occasioned by them, and the best means of prevention—Twenty Sovereigns. To be lodged by 1st November 1884.

The Report to be accompanied, where practicable, by specimens of the insects.

11. On Trees which are best adapted to resist wind storms—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November 1884.

Information is desired both as regards plantations, and single trees, irrespective of the value of the timber.

12. On the Cultivation of the Mushroom (*Agaricus campestris*)—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November 1884.

Reports need not necessarily be confined to Scotland, but it must be shown that the system described can be successfully carried out under the conditions of the Scottish climate and without artificial heat. Information is desired both as regards Mushrooms grown for sale and for private use only.

CLASS II.

DISTRICT COMPETITIONS.

The Money Premiums and Medals awarded at District Competitions will be sent direct to the winners in January next. No payments must, therefore, be made by the Secretary or Treasurer of any local Association.

Grants in aid of DISTRICT COMPETITIONS *for 1885 must be applied for before 1st* NOVEMBER *1884, on Forms to be obtained from the Secretary.*

When a Grant has expired, the District cannot apply again for aid for five years.

SECTION 1.—CATTLE.

Note.—The Society's Cattle Premiums are granted to each District for three alternate years, on condition that the District shall, in the two intermediate years, continue the Competitions by offering for the same description of Stock a sum not less than one-half of that given by the Society.

At the intermediate Competitions, three Minor Silver Medals will be placed at the disposal of the Committee, to be given along with the first prize in the three Classes of Cattle, provided there are not fewer than three lots exhibited in each Class.

The selection of the Breed is left to the local Committee. See Rule 6.

DISTRICTS.

1. CENTRAL BANFFSHIRE.—*Convener*, George Kynoch, jun., Keith; *Secretary*, J. Geddes Brown, Keith. Granted 1880.
2. STIRLINGSHIRE.—*Convener*, Sir James R. Gibson-Maitland of Barnton, Bart., Craigend, Stirling; *Secretary*, Robert Taylor, 22 Barnton Place, Stirling. Granted 1880.
3. ISLANDS OF MULL, COLL, AND TIREE.—*Convener*, James Noel Forsyth of Quinish, Tobermory; *Secretary*, Robert Lang, Aros Mains, Aros, Mull. Granted 1880.
4. RENFREWSHIRE.—*Convener*, Lieut.-Colonel Sir Archibald C. Campbell of Blythswood, Bart., Renfrew; *Secretary*, William Bartlemore, County Buildings, Paisley. Granted 1880.
5. DISTRICT OF BUCHAN.—*Convener*, John Sleigh, Strichen; *Secretary*, James Smith, Burnshangie, Strichen. Granted 1882.

PREMIUMS.

1.	Best Bull, 3-year old and upwards, of any pure breed,	£3
	Second Best,	£2
	Third best,	£1
2.	Best Bull, 2-year old and under, of any pure breed,	£3
	Second best,	£2
	Third best,	£1
3.	Best 2-year old Heifer (if Highland breed, 3 years), of any pure breed,	£3
	Second best,	£2
	Third best,	£1
		£18

The dates of calving of cattle will be counted as from on and after January 1, except Polled Angus and Aberdeen, which will be counted as from on and after December 1.

In 1884.

Nos. 1, 2, 3, and 4 are in competition for the last year.
No. 5, for the second year.

Section 2.—HORSES.

FOR AGRICULTURAL PURPOSES.

Note.—The Society's Stallion Premiums are granted to each District for two years, and are followed by Premiums for other two years for Brood Mares, and again for a similar period by Premiums for Entire Colts and Fillies.

1. Stallions.

1. Lower Annandale.—*Convener*, A. H. Johnstone Douglas of Lockerbie, Glen Stuart, Annan ; *Secretary*, William Roddick, Annan. Granted 1882. (In abeyance in 1882.)

2. Kirriemuir District Agricultural Association.—*Convener*, T. M. Nicoll, Littleton, Kirriemuir; *Secretary*, Andrew Osler, Kintyrie, Kirriemuir. Granted 1883.

3. Dunblane, Doune, and Callander Farmers' Club.—*Convener*, Sir James R. Gibson-Maitland of Barnton, Bart., Craigend House, Stirling. *Secretary*, John Murray, Munnieston, Thornhill, Stirling. Granted 1883.

Premiums.

Best Stallion, rising 3 and not above 12 years old.

No. 1 receives a Premium of £25.
Nos. 2 and 3 receive a Premium of £15 each.

In 1884.

Nos. 1, 2, and 3 are in competition for the last year.

2. Brood Mares.

1. District of Eskdale and Liddesdale.—*Convener*, William Little of Whithaugh, Burnfoot, Ewes, Langholm; *Secretary*, Thos. Stevenson, Langholm. Granted 1883.

2. Morayshire.—*Convener*, Robert M'Kessack of Ardgye and Roseisle, Forres; *Secretary*, William Macdonald, Caledonian Bank Buildings, Elgin. Granted 1883.

3. Lower Ward of Renfrewshire.—*Convener*, Horatio R. B. Peile, Mansion House, Greenock; *Secretary*, John W. Crawford, 26 Hamilton Street, Greenock. Granted 1884.

4. Vale of Alford.—*Convener*, R. O. Farquharson of Haughton, Alford; *Secretary*, John Leonard, Farmton, Alford. Granted 1884.

Premiums.

1. Best Brood Mare, ...	£4
Second best, ...	£3
	£7

In 1884.

Nos. 1 and 2 are in competition for the last year.

Nos. 3 and 4 for the first year.

3. Entire Colts and Fillies.

1. District of Lesmahagow Society.—*Convener*, Gavin Hamilton of Auldtown, Lesmahagow; *Secretary*, John Hamilton, British Linen Co. Bank, Lesmahagow. Granted 1883.

2. District of Carrick.—*Convener*, John Rankine of Beoch, Lochland, Maybole; *Secretary*, David Brown, Maybole. Granted 1883.

3. District of Cupar and St Andrews.—*Convener*, David Bayne Meldrum of Kincaple, St Andrews; *Secretary*, William Dingwall, Ramornie, Ladybank. Granted 1884.

4. Nairnshire.—*Convener*, Robert Anderson of Lochdhu, Nairn; *Secretary*, John Joss, Budgate, Cawdor. Granted 1884.

5. Earl of Selkirk's Tenantry and District.—*Convener*, Andrew Lusk, Howell, Kirkcudbright; *Secretary*, John Gibson, Kirkcudbright. Granted 1884.

6. District of Central Strathearn.—*Convener*, John Kerr, Rossie Ochil, Bridge of Earn: *Secretary*, Robert Gardiner, Chapel Bank, Auchterarder Granted 1884.

PREMIUMS.

1.	Best Entire Colt, foaled after 1st January 1882,	£2	0	0
	Second best,	£1	0	0
2.	Best Entire Colt, foaled after 1st January 1883,	£2	0	0
	Second best,	£1	0	0
3.	Best Filly, foaled after 1st January 1882,	£2	0	0
	Second best,	£1	0	0
	Third best,	£0	10	0
4.	Best Filly, foaled after 1st January 1883,	£2	0	0
	Second best,	£1	0	0
	Third best,	£0	10	0
		£13	0	0

In 1884.

Nos. 1 and 2 are in competition for the last year.
Nos. 3, 4, 5 and 6 for the first year.

Section 3.—SHEEP.

Note.—The Society's Sheep Premiums are granted to each District for three alternate years, on condition that the District shall, in the two intermediate years, continue the Competitions by offering for the same description of Stock a sum not less than one-half of that given by the Society.

At the intermediate Competitions, four Minor Silver Medals will be placed at the disposal of the Committee, to be given along with the first prize in the four Classes of Sheep, provided there are not less than three lots exhibited in each Class.

The selection of the Breed is left to the Local Committee. See Rule 6.

DISTRICTS.

1. District of Dunoon.—*Convener*, A. S. Finlay of Castle Toward, Greenock; *Secretary*, John Dobie, Clydesdale Bank, Dunoon. Granted 1880.

2. District of Dalkeith.—*Convener*, Sir James Gardiner Baird of Saughton Hall, Bart., Inch House, Liberton; *Secretary*, William Harper, Sheriffhall Mains, Dalkeith. Granted 1880.

3. Upper Ward of Lanarkshire.—*Convener*, John Ord Mackenzie of Dolphinton; *Secretary*, David Oswald, Abington. Granted 1880.

4. District of Lochaber.—*Convener*, D. P. M'Donald, Invernevis, Fort-William; *Secretary*, D. Macpherson, Glennevis, Fort-William. Granted 1880.

5. County of Forfar.—*Convener*, Charles Lyall, Old Montrose, Montrose; *Secretary*, Alexander M. Thomson, Accountant, Arbroath. Granted 1882.

6. County of Caithness.—*Convener*, Alexander Henderson of Stemster, Thurso; *Secretary*, James Brims, Solicitor, Thurso. Granted 1882.

7. District of Inveraray.—*Convener*, James Wyllie, Inveraray; *Secretary*, G. Scott, Inveraray. Granted 1881.

PREMIUMS.

1. Best Tup above One Shear,	£2
Second best,	£1
2. Best Shearling Tup,	£2
Second best,	£1
3. Best 3 Ewes above One Shear,	£2
Second best,	£1
4. Best 3 Gimmers or Shearling Ewes,	£2
Second best,	£1
	£12

In 1884.

Nos. 1, 2, 3, 4, 5, and 6 are in competition for the last year.
No. 7 competes for local Premiums.

SECTION 4.—SWINE.

Note.—The Society's Swine Premiums are granted to each District for three alternate years, on condition that the District shall, in the two intermediate years, continue the Competitions by offering for the same description of Stock a sum not less than one-half of that given by the Society.

At the intermediate Competitions two Minor Silver Medals will be placed at the disposal of the Committee, to be given along with the first prize in the two Classes of Swine, provided there are not fewer than three lots exhibited in each Class.

PREMIUMS.

1. Best Boar,	£2
Second best,	£1
2. Best Brood Sow,	£2
Second best,	£1
	£6

In 1884.

No application has been received.

SECTION 5.—DAIRY PRODUCE.

Note.—The Society's Dairy Produce Premiums are granted to each District for three alternate years, on condition that the District shall, in the two intermediate years, continue the Competitions by offering for the same description of Stock a sum not less than one-half of that given by the Society.

At the intermediate Competitions, two Minor Silver Medals will be placed at the disposal of the Committee, to be given along with the first prize in the two Classes of Dairy Produce, provided there are not less than three lots exhibited in each Class.

DISTRICT.

FORTH DAIRY PRODUCE AND CATTLE SHOW SOCIETY.—*Convener*, Thomas Nimmo, Lawhead, Forth, Lanark; *Secretary*, James Haig, Wilsontown, Lanark. Granted 1883.

PREMIUMS.

1. Best Couple of Sweet Milk Cheeses,	£2
Second best,	£1
2. Best Cured Butter (not less than 14 lbs.),	£2
Second best,	£1
	£6

In 1884.

The District of Forth competes for local Premiums.

RULES OF COMPETITION.

1. The Members of the Highland and Agricultural Society connected with the respective districts are appointed Committees for arranging the Competitions, the Convener being appointed by the Directors; five members to be a quorum.

2. The Convener of each District shall summon a meeting of Committee for the purpose of determining the time and place of Competition, the nomination of Judges, and other preliminary arrangements. The time and place (which must be within the bounds of the District, unless in reference to Stallions) shall be publicly intimated by Conveners.

3. The Money Premiums awarded at District Competitions will be paid in January next, by precepts issued by the Directors. No payments must, therefore, be paid by the Secretary or Treasurer of any local Association. Medals will be issued at same time.

4. Stock must be the property of the Exhibitor at the date of Entry. *No entry shall be received later than one week previous to the Show.* Entry-Money shall not exceed 2½ per cent. on the amount of the Premium to be competed for.

5. The Competitions (except for Stallions to serve in the District) must take place between the 1st of April and the 26th of October, and are open to general competition to all parties within the boundaries of the District of the local Society, whether members of the local Association or not. The Stallion Premiums are open to all comers, or the Horses may be selected at the Glasgow Stallion Show on permission to that effect being obtained.

6. The Committee shall select the breed, and specify it in the returns. In Cattle the animals exhibited must belong to one of the following pure breeds—Shorthorn, Ayrshire, Polled (Galloway, Angus, or Aberdeen). Highland. The Bulls may be of one breed, and the Heifers of another. In Sheep, the breeds must be Leicester, Cheviot, or Blackfaced.

7. Stock of an inferior description, or which does not fall within the prescribed regulations, shall not be placed for competition.

8. The Premiums shall not be divided. In Cattle, Horses (except Stallions to serve in the district), Sheep, and Swine, five lots in each Class will warrant the award of full, and three lots of half, Premiums. In Dairy Produce, eight Exhibitors in any one Class will warrant an award of full, and four of half, Premiums. A Competitor may exhibit two lots in each Class, except in Dairy Produce, where only one lot is allowed from the same farm. No animal to be allowed to compete in more than one section.

9. To authorise the award of the Medals in the intermediate year, there must be not less than three lots in each Class, and the Society's Regulations must be adhered to.

10. An animal which has gained the Highland and Agricultural Society's first Money Premium at a previous District or General Show is inadmissible in the same Class (except in the case of Stallions); and one which has

gained a second Money Premium can only thereafter compete in that Class for the first.

11. A Bull the property of two or more Tenants may compete, although the Exhibitors may not be Joint-Tenants.

12. Bulls for which Money Premiums are awarded may be required to serve in the District at least one season; the rate of service to be fixed by the Committee, and the prizes may be withheld till the conditions are fulfilled. Premiums for the Heifers may be retained till the animals are certified to have calved.

13. Evidence must be produced that the Prize Stallions have had produce.

14. Mares must have foals at foot (except when death of foal is certified), or be entered as being in foal; in the latter case payment of the Premiums will be deferred till certificate of birth, which must be within 11 months from the date of the Show.

15. All Prize Tups must serve within the District during the season following the Competition. Ewes and Gimmers must be taken from the Exhibitor's stock, and must have been bred by him in the District; and Ewes must have reared Lambs during the ordinary season of the District.

16. Sheep must have been clipped bare during the season, and the Judges are instructed to examine the fleeces of the sheep selected for prizes, and to cast those on which they find any of the former fleece. Fleeces must not be artificially coloured.

17. Should it be proved to the satisfaction of the Committee that an animal has been entered under a false name, pedigree, or description, for the purpose of misleading the Committee or Judges as to its qualifications or properties, the case shall be reported to the Directors, and submitted by them to the first General Meeting, in order that the Exhibitor may be disqualified from again competing for the Society's Premiums, and his name, if he is a member, struck from the roll, or his case otherwise disposed of as the Directors may determine.

18. When an animal has previously been disqualified by the decision of any Agricultural Association in Great Britain or Ireland, such disqualification shall attach, if the Exhibitor, being aware of the disqualification, fail to state it and the grounds thereof, in his entry, to enable the Committee to judge of its validity.

19. Competitors must certify that the Butter and Cheese exhibited by them are average specimens of the produce of their dairies in 1884, and that the quantity produced during the season has not been less than 1 cwt. of Butter, or 2 cwt. of Cheese.

20. It is to be distinctly understood that in no instance does any claim lie against the Highland and Agricultural Society for expenses attending a show of stock beyond the amount of the Premiums offered.

21. Blank reports will be furnished to the Conveners and Secretaries of the different Districts. These must, in all details, be completed, and lodged with the Secretary *on or before the 1st of November next*, for the approval of the Directors, against whose decisions there shall be no appeal.

22. A report of the Competitions and Premiums awarded at the *intermediate* local shows in the several Districts for Cattle and Sheep, signed by a member of the Society, must be transmitted to the Secretary *on or before the 1st November in each year*, otherwise the Society's grants shall terminate.

23. When a grant has expired, the District cannot apply again for aid for five years.

Section 6.—SPECIAL GRANTS.

£50 to the Glasgow Agricultural Society—*Joint-Secretaries*, David Inglis and Andrew Todd, 145 St Vincent Street, Glasgow. Granted 1884.

£20 to the Ayrshire Agricultural Association, to be competed for at the Dairy Produce Show at Kilmarnock.—*Convener*, The Hon. G. R. Vernon, Auchans House, Kilmarnock; *Secretary*, James M'Murtrie, Ayr. Granted 1872.

£3 to Orkney Agricultural Society.—*Convener*, Colonel Balfour of Balfour and Trenabie, Kirkwall; *Secretary*, James Johnston, jun., Hall of Tankerness, Kirkwall. Granted 1883.

£3 to Rousay Agricultural Society.—*Convener*, General Burroughs of Rousay, C.B.; *Secretary*, John Gibson, Langskail, Rousay. Granted 1883.

Section 7.—MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Society, being anxious to co-operate with local Associations, will give a limited number of Minor Silver Medals annually to Societies, not on the list of Cattle, Horse, or Sheep Premiums, in addition to the Money Premiums awarded in the Districts for—

1. Best Bull, Cow, Heifer of any pure breed, or Ox.
2. Best Stallion, Mare, or Gelding.
3. Best Tup, or Pen of Ewes or Wethers.
4. Best Boar, Sow, or Pig.
5. Best Coops of Poultry.
6. Best sample of any variety of Wool.
7. Best sample of any variety of Seeds.
8. Best managed Farm.
9. Best managed Green Crop.
10. Best managed Hay Crop.
11. Best managed Dairy.
12. Best Sweet Milk Cheese.
13. Best Cured Butter.
14. Best sample of Honey, not less than 5 lbs., taken without destroying the bees.
15. Best collection of Roots.
16. Best kept Fences.
17. Male Farm Servant who has been longest in the same service, and who has proved himself most efficient in his duties, and to have invariably treated the animals under his charge with kindness.
18. Female Servant in charge of Dairy and Poultry who has been longest in the same service, and who has proved herself most efficient in her duties, and to have invariably treated the animals under her charge with kindness.
19. Best Sheep Shearer.
20. Most expert Hedge Cutter.
21. Most expert Labourer at Draining.
22. Most expert Farm Servant at trial of Reaping Machines.
23. Best Maker of Oat Cakes.

It is left to the local Society to choose out of the foregoing list the classes for which the Medals are to be competed.

The Medals are given for five consecutive years.

Aberdeenshire.

1. Auchindoir, Kildrummie, and Towie Association. — *Convener*, Carlos P. Gordon of Wardhouse, Insch; *Secretary*, William Walker, Ardhuncart, Mossat. 4 Medals. Granted 1881.

2. Cluny, Monymusk, and Midmar Association.—*Convener*, Ranald Macdonald, Cluny Castle, Aberdeen; *Secretary*, James Christie, Backhill of Castle Fraser, Kemnay, Aberdeen. 2 Medals. Granted 1881.

3. Cromar, Upper Dee, and Donside Association.—*Convener*, Sir John Forbes Clark, Bart., Tillypronie, Tarland; *Secretary*, William Thomson, Tarland. 4 Medals. Granted 1881.

4. Ebrieside Association.—*Convener*, Wm. Leask, Skilmafilly, Ellon; *Secretary*, William Hetherwick, Knoxhill, Ellon. 5 Medals. Granted 1881.

5. Fyvie Association.—*Convener*, James Mackie, Lewes, Fyvie; *Secretary*, James Ironside, Steinmanhill, Fyvie. 2 Medals. Granted 1880.

6. Kinnethmont Association.—*Convener*, Col. Leith Hay of Rannes, C.B., Leith Hall, Kinnethmont; *Secretary*, James R. Moir, Leslie Place, Aberdeen. 5 Medals. Granted 1881.

7. Mar Association.—*Convener*, William Wishart, Cairntradlyn, Kinellar, Blackburn; *Secretary*, Silvester Campbell, jun., Tofthills, Kintore. 2 Medals. Granted 1882.

8. North-East Aberdeenshire Society.—*Convener*, Sir Alexander Anderson, Aberdeen; *Secretary*, G. A. Cruickshank, Nether Cortes, Lonmay. 6 Medals. Granted 1880.

9. North of Scotland Root, Vegetable, and Fruit Association.—*Convener*, A. F. Nares, Brucktor, Old Meldrum; *Secretary*, James Smith, Agent, Inverurie. 2 Medals. Granted 1881.

10. Strichen Society.—*Convener* and *Secretary*, John Sleigh, Strichen Mains, Strichen. 2 Medals. Granted 1882.

Argyllshire.

11. Kintyre Society.—*Convener*, Colonel Mackay of Carskey, Campbeltown; *Secretary*, James Hamilton, Royal Bank, Campbeltown. 4 Medals. Granted 1882.

12. Mull, Coll, and Tiree.—*Convener*, James Noel Forsyth of Quinish, Tobermory; *Secretary*, Robert Lang, Aros Mains, Aros, Mull. 4 Medals. Granted 1880.

Ayrshire.

13. Beith Society.—*Convener*, William Bartlemore, County Buildings, Paisley; *Secretary*, William Fulton Love, Writer, Beith, Ayrshire. 2 Medals. Granted 1881.

14. Coylton and Stair Society.—*Convener*, Major-General Burnett of Gadgirth, Tarbolton; *Secretary*, Robert Caldwell, Knockshoggle, Tarbolton. 2 Medals. Granted 1882.

15. Craigie Society.—*Convener*, R. Drummond, Pocknave, Craigie, Kilmarnock; *Secretary*, Andrew M'Farlane, Schoolhouse, Craigie. 3 Medals. Granted 1881. (In abeyance in 1883.)

16. Galston Horticultural Society.—*Convener*, Robert Mackie, Draffen House, Stewarton; *Secretary*, William M'H. Hendrie, Drumdroch, Galston. 3 Medals. Granted 1880.

17. Kilmarnock Society.—*Convener*, Robert Guthrie, Crossburn, Troon; *Secretary*, Jas. Wilson, Banker, Kilmarnock. 4 Medals. Granted 1882. (In abeyance in 1883.)

18. Muirkirk Society.—*Convener*, Robert Millar, Alloway Cottage, Ayr; *Secretary*, Alexander Donald, The Schoolhouse, Muirkirk. 6 Medals. Granted 1881.

19. New Cumnock.—*Convener*, John Picken, Mansfield Mains, New Cumnock; *Secretary*, William F. Haddow, Riggfoot, New Cumnock. 4 Medals. Granted 1881.

Berwickshire.

20. East of Berwickshire Agricultural Association.—*Convener*, Jonathan Melrose of Monynut, Coldstream; *Secretaries*, Bowhill & Doughty, Ayton. 3 Medals. Granted 1883.

Dumbartonshire.

21. Kirkintilloch Society.—*Convener*, William Burt Wright, Auchinvole Castle, Croy; *Secretary*, Andrew Matson, National Bank of Scotland, Kirkintilloch. 4 Medals. Granted 1882.

Dumfriesshire.

22. Moffat and Upper Annandale Society.—*Convener*, Walter Johnstone, Alton, Moffat; *Secretary*, Alexander Scott, Hillside, Lockerbie. 4 Medals. Granted 1881.

Elginshire.

23. Forres and Northern Fat Cattle Club.—*Convener*, Richard H. Harris, Earnhill, Forres; *Secretary*, Robert Urquhart, jun., Forres. 6 Medals. Granted 1881.

Fifeshire.

24. Windygates Society.—*Convener*, H. V. Haig of Bridgend, Cameron Bridge, Windygates; *Secretary*, David Normand, Kennoway. 2 Medals. Granted 1882.

Inverness-shire.

25. Inverness Farmers' Society.—*Convener*, Duncan Forbes of Culloden, Inverness; *Secretary*, Donald Paterson, Balrobert, Inverness. 5 Medals. Granted 1884.

26. Strathspey Club.—*Convener*, Earl of Seafield, Castle Grant, Grantown; *Secretary*, John Grant, Advie Mains, Strathspey. 5 Medals. Granted 1881.

Lanarkshire.

27. Calderwaterhead Society.—*Convener*, Peter Forrest, Shotts; *Secretary*, James Ferguson, Fairnieshaw, Holytown. 2 Medals. Granted 1881.

28. Carmunnock Farmers' Society.—*Convener*, Andrew Hoggan, jun., Busby Farms, Busby; *Secretary*, Andrew Robertson, Carmunnock, Rutherglen. 2 Medals. Granted 1883.

29. Carnwath Society.—*Convener*, Hector F. M'Lean, Carnwath House; *Secretary*, George Russell, Carnwath. 4 Medals. Granted 1878. (In abeyance in 1881, 1882, and 1883.)

30. Old Monkland Society.—*Convener*, Wm. J. Andrew, Banker, Coatbridge; *Secretary*, John Couper, Bank Buildings, Coatbridge. 1 Medal. Granted 1883.

Perthshire.

31. Dunblane Poultry, &c., Society.—*Convener*, Peter M'Caull, Dykedale, Dunblane; *Secretary*, David Sword, Helensfield, Dunblane. 2 Medals. Granted 1884.

32. Moulin Association.—*Convener and Secretary*, R. M'Gillewie, Balnadrum, Pitlochry. 1 Medal. Granted 1881.

33. Stormont Union Society.—*Convener*, Sir Alex. Muir Mackenzie of Delvine, Bart.; *Secretary*, Robert Grant, The Pleasance, Coupar Angus. 5 Medals. Granted 1880.

Renfrewshire.

34. Johnstone West of Scotland Society.—*Convener*, Robert Wilson, Manswraes, Kilbarchan; *Secretary*, Robert Reid, Banker, Johnstone. 2 Medals. Granted 1883.

35. Lochwinnoch Society.—*Convener*, William Bartlemore, County Buildings, Paisley; *Secretary*, Robert Reid, Banker, Lochwinnoch. 2 Medals. Granted 1881.

Ross-shire.

36. Black Isle Society.—*Convener*, James Fletcher of Rosehaugh, Avoch; *Secretary*, William Murray, Bellfield, Inverness. 3 Medals. Granted 1881.

Stirlingshire.

37. Kilsyth Society.—*Convener*, James Patrick, Queenzieburn. Milton of Campsie; *Secretary*, R. M. Lennox, Writer, Kilsyth. 2 Medals. Granted 1880.

The Medals are given for five consecutive years.

Applications from other Districts must be lodged with the Secretary of the Society *by 1st November next.*

RULES OF COMPETITION.

1. All Competitions must be at the instance of a local Society.

2. The classes for which Medals are granted must be in accordance with the list at page 45. The Committee shall select the classes, and specify them in the return.

3. In each District the Convener (who must be a member of the Society appointed by the Directors) shall fix the time and place of Competition, appoint the Judges, and make all other necessary arrangements, in concurrence with the other Members of the Society, and the local Association of the District.

4. The Money Premiums given in the District must be £2 for each Medal claimed.

5. The Medal for Sheep Shearing shall not be awarded unless there are three competitors, and it shall always accompany the highest Money Premium. There must not be fewer than two competitors in all the classes.

6. Blank reports will be furnished to all the Conveners of the different Districts. These must, in all details, be completed and lodged with the Secretary *on or before the 1st of November next*, with the exception of green crop reports, which must be forwarded on or before the 20th of December,

for the approval of the Directors, against whose decisions there shall be no appeal.

7. When a grant has expired, the District cannot apply again for aid for five years.

Section 8.—PLOUGHING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first or highest Premium at Ploughing Competitions, provided a Report in the following terms is made to the Secretary, within one month of the Competition, by a Member of the Society :—

FORM OF REPORT.

I of Member of the Highland and Agricultural Society, hereby certify that I attended the Ploughing Match of the Association at in the county of on the when ploughs competed ; of land was assigned to each, and hours were allowed for the execution of the work. The sum of £ was awarded in the following proportions, viz. .—

[Here enumerate the names and designations of successful Competitors.]

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Ploughing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of the Secretary, must be registered with the Secretary of the Highland and Agricultural Society, 3 George IV. Bridge, Edinburgh.

3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.

4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can only report one Match, and a Ploughman cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal there must have been twelve ploughs in Competition, and Three Pounds awarded in Premiums by the local Society. The Medal to be given to the winner of the first or highest prize.

7. Ploughmen shall not be allowed any assistance, and their work must not be set up nor touched by others ; on land of average tenacity the ploughing should be at the rate of an imperial acre in ten hours, and attention should be given to the firmness and sufficiency of the work below more than to its neatness above the surface.

CLASS III.

COTTAGES AND GARDENS.

The following Premiums are offered for Competition in the Parishes after mentioned.

The Premiums for Cottages and Gardens are given for five consecutive years.

Section I.—PREMIUMS FOR BEST KEPT COTTAGES AND GARDENS.

1. Best kept Cottage,	£1	0	0
Second best,	0	10	0
2. Best kept Cottage Garden,	1	0	0
Second best,	0	10	0

Argyllshire.

1. Coll.—*Convener*, John Lorne Stewart of Coll; *Secretary*, J. A. Hain, Island of Coll, Oban. Granted 1882.
2. Lorn Horticultural Society.—*Secretary*, Arch. Mitchell, Oban. Granted 1884.

Dumbartonshire.

3. Cardross.—*Secretary*, Mrs Murray, Moore Park, Cardross. Granted 1881.

Edinburghshire.

4. Currie and Balerno.—*Convener*, Sir James H. Gibson-Craig of Riccarton, Bart., Currie; *Secretary*, James Hutchison, jun., Cocklaw, Currie. Granted 1881.

Fifeshire.

5. Kingskettle Horticultural Society.—*Convener*, William Dingwall, Ramornie, Ladybank; *Secretary*, John Scott, Kettle Bridge, Kettle. Granted 1883.
6. Newburgh District Gardening Society.—*Secretary*, George Anderson, Tay View, Newburgh. Granted 1882.

Lanarkshire.

7. Abington Floral and Horticultural Society.—*Convener*, John Morton, Nether Abington, Abington; *Secretary*, George Hastie, Abington. Granted 1881.
8. Larkhall Horticultural Society.—*Convener*, William Forrest of Lawmuir, Hamilton; *Secretary*, Robert Cooper, jun., Braehead, Larkhall. Granted 1883.

Linlithgowshire.

9. Kirkliston Horticultural Society.—*Convener*, Peter Glendinning, The Leuchold, Dalmeny Park, Edinburgh; *Secretary*, James Brown, Schoolhouse, Kirkliston. Granted 1882.
10. Torphichen Horticultural Society.—*Convener*, Colonel Gillon of Wallhouse, Bathgate; *Secretary*, Wm. Arbuckle, Torphichen, Bathgate. Granted 1882.

Perthshire.

11. Bridge of Earn Horticultural Society.—*Convener*, Thomas Richmond, Hilton, Perth; *Secretary*, Peter Fordyce, Heughfield House, Bridge of Earn. Granted 1882.
12. Dunning Horticultural Society.—*Convener*, Robert Gardiner, Chapelbank, Auchterarder; *Secretary*, Johnstone Wright, Dunning. Granted 1880.

Ross-shire.

13. Edderton Society.—*Convener*, W. E. Catley of Edderton, Ross-shire ; *Secretary*, James Ross, Balblair, Edderton, Ross-shire. Granted 1882.
14. Wester Ross Horticultural Society.—*Convener*, Sir Kenneth S. Mackenzie of Gairloch, Bart.; *Secretary*, David Munro, 65 High Street, Dingwall. Granted 1881.

RULES OF COMPETITION.

1. Competitions may take place in the different parishes for Cottages and Gardens, or for either separately.
2. The occupiers of Lodges at Gentlemen's Approach Gates and Gardener's Houses are excluded, as well as others whom the Committee consider, from their position, not to be entitled to compete. The inspection must be completed by the 1st of October. In making the inspection, the Conveners may take the assistance of any competent judges.
3. It is left to the Committee of the District to regulate the maximum annual rent of the Cottages, which may, with the garden, be from £5 to £7.
4. To warrant the award of full Premiums, there must not be fewer than three competitors in each class.
5. A person who has gained the highest Premium cannot compete again.
6. If the Cottage is occupied by the proprietor, the roof must be in good repair ; if the roof is thatch, it must be in good repair, though in the occupation of a tenant. The interior and external conveniences must be clean and orderly—the windows must be free of broken glass, clean, and affording the means of ventilation. Dunghills, and all other nuisances, must be removed from the front and gables. In awarding the Cottage Premiums, preference will be given to Competitors who, in addition to the above requisites, have displayed the greatest taste in ornamenting the exterior of their houses, and the ground in front and at the gables.
7. In estimating the claims for the Garden Premiums, the judges should have in view :—The sufficiency and neatness of the fences and walks ; the cleanness of the ground ; the quality and choice of the crops ; and the general productiveness of the garden.
8. Reports, stating the number of Competitors, the names of successful parties, and the nature of the exertions which have been made by them, must be transmitted by the Conveners to the Secretary *on or before the 1st November next.*
9. When a grant has expired, the District cannot apply again for aid for five years.

Parishes desirous of these Premiums must lodge applications with the Secretary *on or before the 1st November next.*

Section 2.—MEDALS FOR COTTAGES AND GARDENS OR GARDEN PRODUCE.

The Society will issue annually two Minor Silver Medals to a limited number of local Associations or individuals, who at their own expense establish Premiums for Cottages or Gardens under £15 of Rent. The Medals may be awarded for best kept Cottage, and best kept Garden or Flower Plot, or Garden Produce.

Local Associations or individuals desirous of these Medals, must lodge applications with the Secretary *on or before the 1st November next.* The Medals are given for five consecutive years.

Aberdeenshire.

1. Udny Horticultural Society.—*Convener*, Alexander Keith, Chapelton, Ellon; *Secretary*, Thomas Duguid, Mosshead, Udny. Granted 1881.

Ayrshire.

2. Galston Horticultural Society.—*Convener*, Robert Mackie, Draffen House, Stewarton; *Secretary*, W. M'H. Hendrie, Drumdroch. Granted 1881.
3. Loudoun Horticultural Society.—*Convener*, Robert Mackie, Draffen House, Stewarton; *Secretary*, George Neil, Greenhead Street, Newmilns, Kilmarnock. Granted 1883.

Edinburghshire.

4. Liberton and Newton Horticultural Society.—*Convener*, Thomas Mylne, Niddrie Mains, Liberton; *Secretary*, James Anderson, Schoolhouse, Gilmerton. Granted 1882.

Elginshire.

5. Dyke Horticultural Society.—*Convener*, Hugh Brodie of Brodie, Brodie Castle, Forres; *Secretary*, J. Clark, Brodie Gardens, Forres. Granted 1882.

Fifeshire.

6. Kirkcaldy Horticultural Society.—*Convener*, William Drysdale of Kilrie, Kinghorn; *Secretary*, John Leslie, West Mills, Kirkcaldy. Granted 1880.
7. Strathmiglo and District Horticultural Society.—*Convener*, Alexander Troup, Strathmiglo; *Secretary*, James Somers, Postmaster, Strathmiglo. Granted 1883.

Haddingtonshire.

8. Pencaitland Horticultural Society—*Convener*, William Wilson, Wolfstar, Tranent; *Secretary*, Peter Cossar, Pencaitland. Granted 1883.

Lanarkshire.

9. Biggar Horticultural Society—*Convener*, J. L. Murray of Heavyside, Biggar; *Secretary*, Andrew Smail, Biggar. Granted 1883.
10. Blantyre Horticultural Society.—*Convener*, John Craig of Bellsfield, Blantyre; *Secretary*, William Gardiner, jun., Blantyre. Granted 1884.
11. Carnwath Horticultural Society.—*Convener*, George Russell, Carnwath; *Secretary*, David Aitken, Carnwath. Granted 1880.
12. Gartsherrie Works Horticultural Society.—*Convener*, Dr Bruce Goff, Woodlea, Bothwell; *Secretary*, George R. Horne, Millside, Bothwell. Granted 1881.
13. Law Floral and Horticultural Society.—*Convener*, Sir W. C. Anstruther, Bart., Carmichael House, Thankerton; *Secretary*, John Greenhorn, Law Junction, Carluke. Granted 1884.
14. Mauldslie and Rosebank Horticultural Society.—*Convener*, Colonel Hozier of Newlands, Mauldslie Castle, Carluke; *Secretary*, Robert Gardiner, Millburn Lodge, Netherburn, Hamilton. Granted 1882.
15. Rutherglen Victoria Gardens Association.—*Convener*, Col. F. Robertson Reid of Gallowflat, Rutherglen; *Secretary*, John Gordon, jun., 51 Main Street, Rutherglen. Granted 1884.
16. Shettleston Horticultural Society.—*Secretary*, Alexander Hay, Shettleston House, Shettleston. Granted 1881.

Linlithgowshire.

17. Abercorn Horticultural Society.—*Convener*, Colonel Hare of Calder Hall; *Secretary*, John Martin, Hope Cottage, Hopetoun, South Queensferry. Granted 1884.

Nairnshire.

18. Auldearn Flower Show.—*Convener*, Hugh Brodie of Brodie, Brodie Castle, Forres; *Secretary*, James Carson, Auldearn, Nairn. Granted 1880.

19. Cawdor Horticultural and Industrial Society.—*Convener*, Robert Fraser, Brackla, Nairn; *Secretary*, John M'Arthur, Broomhill, Cawdor, Nairn. Granted 1884.

Perthshire.

20. Almond Valley Horticultural Society.—*Convener*, J. D. Lumsden, Pitcairnfield, Perth; *Secretary*, William Robertson, Huntingtowerfield, Perth. Granted 1884.

21. Blairgowrie and Rattray Horticultural Society.—*Convener*, John Anderson, Royal Hotel, Blairgowrie; *Secretary*, Henry Dryerre, 10 High Street, Blairgowrie. Granted 1880.

22. Caputh—*Convener*, Sir Alex. M. Mackenzie of Delvine, Bart., Dunkeld; *Secretary*, R. Miller, Spittalfields, Caputh, Dunkeld. Granted 1883.

23. Cherrybank Horticultural Society.—*Convener*, William Macdonald, Woodlands, Perth; *Secretary*, William Law, Cherrybank, Perth. Granted 1882.

24. Coupar Angus Horticultural Society.—*Convener*, Thomas Ferguson, Kinochtry, Coupar Angus; *Secretary*, T. B. Farquharson, Coupar Angus. Granted 1884.

25. Dunkeld and Birnam Horticultural and Poultry Association.—*Convener*, John Macgregor, Ladywell, Dunkeld; *Secretary*, Robert Robertson, Ladywell, Dunkeld. Granted 1880.

Renfrewshire.

26. Renfrew Horticultural Society.—*Convener*, William Herron, Renfrew; *Secretary*, Robert S. Milne, Renfrew. Granted 1883.

Sutherlandshire.

27. Golspie Horticultural Society.—*Convener*, J. B. Dudgeon, Crakaig, Golspie; *Secretary*, Andrew Lindsay, Golspie. Granted 1883.

REGULATIONS.

1. Competitions may take place in the different districts for Cottages and Gardens, or for either separately.

2. The annual value of each Cottage, with the ground occupied in the parish by a Competitor, must not exceed £15.

3. If Competition takes place for Garden Produce in place of the best kept Garden, such produce must be *bona fide* grown in the Exhibitor's Garden, and he will not be allowed to make up a collection from any other Garden.

4. To warrant the award of the Medals, there must not be fewer than three Competitors.

5. Blank reports will be furnished to the Conveners and Secretaries of the different Districts. These must, in all details, be completed and lodged with the Secretary *on or before the 1st November next*, for the approval of the Directors, against whose decisions there shall be no appeal.

6. When a grant has expired, the District cannot apply again for aid for five years.

Section 3.—IMPROVING EXISTING COTTAGES.

To the Proprietor in Scotland who shall report the Improvement of the greatest number of Cottages during the years 1881, 1882, and 1883—The Gold Medal.

Section 4.—BUILDING NEW COTTAGES.

To the Proprietor in Scotland who shall report the Erection of the greatest number of approved Cottages during the years 1880, 1881, 1882, and 1882—The Gold Medal.

RULES OF COMPETITION.

1. Claims for the Premiums Nos. 3 and 4 must be lodged with the Secretary on or before the 1st of October next, to allow an inspection to be made of the different Cottages. The inspection will be conducted by a Committee of the Society's Members, and Reports must be transmitted to the Secretary *on or before the 1st November next.*

2. The annual value of the Cottage or Cottages separately, with the garden ground, must not exceed £5.

3. In estimating the claims of the Competitors, the following points will be kept in view:—The external appearance of the Cottages; their internal accommodation; the arrangements of the out-houses; the means of drainage and ventilation; and the expense of the building or of the alteration, compared with its durability and accommodation. When the Cottages of one Competitor are superior in style and comfort to those of another, though not so numerous, the Inspectors will give them preference, provided they amount at least to three, and have been erected at a moderate expense.

4. Parties competing will forward to the Society Plans, Specifications, and Estimates, of which, and of all information sent therewith, copies may be taken for publication, if the Society shall see fit, and the originals returned to the parties within six months, if desired.

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

GENERAL SHOW OF STOCK AND IMPLEMENTS

ON

DEAN PARK, EDINBURGH,

ON 22D, 23D, 24TH, AND 25TH JULY 1884,

The Centenary of the Society.

President of the Society.

HIS GRACE THE DUKE OF RICHMOND AND GORDON, K.G.

Chairman of the Local Committee.

ROBERT DUNDAS, ESQUIRE OF ARNISTON.

The District connected with the Show comprises the Counties of Edinburgh, Haddington, and Linlithgow.

REGULATIONS.

GENERAL CONDITIONS.

1. The Competition is open to Exhibitors from all parts of the United Kingdom.

2. Every Lot must be intimated by a Certificate of Entry, lodged with the Secretary *not later than the 21st May for Implements, and 4th June for Stock and other Entries.* Printed forms will be issued on application to the Secretary, No. 3 George IV. Bridge, Edinburgh. Admission Orders will be forwarded to Exhibitors, by post, previous to the Show.

3. Protests against the awards of the Judges, or against a violation of the judging regulations, must be lodged with the Secretary not later than 9 A.M. on Wednesday, 23d July, and parties must be in attendance at the Committee-Room, in the Showyard, at 10 A.M. that day, when protests will be disposed of. All protests must be accompanied by the deposit of £2, 2s., and if not sustained the sum will be forfeited to the Society at the discretion of the Board.

4. Protests lodged for causes which the protestor produces no good evidence to substantiate, will render him liable to be reported to the Board of Directors, with the view, if they see reason, to his being prohibited from again entering stock for a General Show.

5. The Society shall not be liable for any loss or damage which Stock, Poultry, Implements, or other articles may sustain at the Show, or in transit.

6. The decisions of the Board of Directors are final in all questions respecting Premiums and all other matters connected with the Show, and it shall not be competent for any Exhibitor to appeal against such decisions to, nor seek redress in respect of them from, any other tribunal.

7. Covered Booths for Offices (9 feet by 9 feet), purely for business, not

for exhibition of goods, can be had for £3, 10s. to Members, and £5 to Non-Members. Intimation to be made to the Secretary before the 20th of June.

8. No lights allowed in the Yard at night, and Smoking is strictly prohibited within the sheds. Those infringing this Rule will be fined 10s.

9. As the command of water in the Yard is limited, it is particularly requested that waste be avoided.

10. When the ground requires to be broken, the turf must be carefully lifted and laid aside, and the surface must be restored to the satisfaction of the Society, and at the expense of the Exhibitor.

11. All persons admitted into the Showyard shall be subject to the Rules and Orders of the Directors.

12. The violation by an Exhibitor of any one of the Regulations will involve the forfeiture of all Premiums awarded to him, or of such a portion as the Directors may ordain.

13. Railway Passes for unsold Stock and implements must be applied for at the Committee Room in the Yard between 9 and 11 o'clock on the forenoon of Thursday and Friday.

14. The Show terminates at 5 P.M. on Friday, 25th July, and no animal or article can be withdrawn before that hour. Stock and Implements may remain in the Yard till Saturday afternoon.

15. The Premiums awarded will be paid in November 1884, and, with the exception of the Tweeddale Gold Medal and the Silver Medals, may be taken either in money or in plate, unless otherwise provided for in the special prizes.

STOCK AND POULTRY.

16. Stock and Poultry to be entered with the Secretary on or before the 4th day of June. Received in the Yard on Monday, 21st, and till 10 A.M. on Tuesday, 22d July. Judged at 11 A.M. on Tuesday. Exhibited on Tuesday, Wednesday, Thursday, and Friday, 22d, 23d, 24th, and 25th July.

17. All animals must be entered in the sections applicable to their ages, and cannot be withdrawn after entry.

18. No animal to be allowed to compete in more than one section, except for family and special prizes, animals for which may be drafted from the regular classes.

19. Shorthorn, Polled Angus or Aberdeen, and Galloway animals, must be entered in the herd books, or the Exhibitor must produce evidence that his animal is eligible to be entered therein.

20. Stock must be *bona fide the property and in the possession of* the Exhibitor from the 4th June (the last day of Entry), except where otherwise allowed in the family and special prizes.

21. The schedule of Entry must be filled up so far as within the knowledge of the Exhibitor.

22. The name of the Breeder, if known, must be given, and if the Breeder is not known, a declaration to that effect, signed by the Exhibitor, must be sent along with the Schedule, and no pedigree will be entered in the Catalogue when the Breeder is unknown.

23. Should it proved to the satisfaction of the Directors that an animal has been entered under a false name, pedigree, or description, for the purpose of misleading the Directors or Judges as to its qualification or properties, the case shall be reported to the first General Meeting, in order that the Exhibitor shall be disqualified from again competing at the Society's Shows, and his name, if he be a member, struck from the roll, or his case otherwise disposed of as the Directors may determine.

24. All former prize animals are eligible to compete.

25. When an animal has previously been disqualified by the decision of any Agricultural Association in Great Britain or Ireland, such disqualifi-

cation shall attach, if the Exhibitor, being aware of the disqualification, fail to state it, and the grounds thereof, in his entry, to enable the Directors to judge of its validity.

26. Breeding Stock must not be shown in an improper state of fatness, and the Judges will be prohibited from awarding Premiums to overfed animals.

27. No animal shall bear on its rug, harness, pail, or other fittings, any initial, crest, or mark of ownership, nor be distinguished otherwise than by the number indicating its place in the Catalogue.

28. Exhibitors shall be answerable for all acts, whether committed by themselves, their servants, or others, and shall be responsible for the condition of their animals during the whole time they remain in the Showyard.

29. No animal to be taken out of its stall after 10 A.M. during the Show, except by order of the Judges, or with permission of the Secretary. Those infringing this Rule will be fined 10s.

30. Aged Bulls and Stallions must have had produce, and, along with Two-year-old-Bulls, Three-year-old-Colts, and aged Tups, have served within the year of the Show.

31. All Cows must have had calves previous to the Show, and when exhibited they must either be in milk or in calf; if in milk, birth must have been within 9 months of the Show; if in calf, birth must be certified within 9 months after the Show. In the case of Ayrshire Cows in Calf, and Ayrshire Heifers in Calf, calved before 1st January 1882, birth must be certified 9 months after the Show. This Rule does not apply to Animals in Family Prizes.

32. Cows in the Family and Group Prizes to be shown in milk, and to have had calves not more than 9 months before the Show. Two-year-old Heifers in the Family and Group Prizes to be certified to have been served before the Show.

33. All Milch Cows of the Ayrshire breed must be in the Yard on the evening of Monday, 21st July, before 8 o'clock, after which they will be inspected by the Veterinary Surgeon, or other official of the Society, between 8 and 9 o'clock, to see if they have been milked dry; and if not, they must be milked under his direction, and, after the judging, all Milch Cows must be milked morning and evening.

34. Any artificial contrivance or device of any description found on or proved to have been used on an animal, either for preventing the flow of milk or for any other improper purpose, will disqualify that animal from being awarded a Premium, and the Owner of said animal will be prohibited from again entering stock for any of the Society's General Shows, or for such a period as the Directors may see fit.

35. Two-year-old Heifers—of the Shorthorn and Polled Breeds—must be in calf when exhibited, and the premiums will be withheld till birth be certified, which must be within 9 months after the Show. This Rule does not apply to Animals in the Family Prizes.

36. Animals of any age that have had a calf must be shown as Cows.

37. Mares in Sections 5 and 14 must have produced foals after 1st January 1884, and foals must be at foot, except when death can be proved. Mares in Section 6 must be in foal, and awards will be suspended till birth is certified, which must be within 11 months from the date of the Show.

38. With reference to regulations 31 and 35, birth of at least a seven months' calf must be certified; and in regard to regulation 37, birth of at least a nine months' foal.

39. Horses entered as Hunters are expected to be jumped in the Horse Ring, but this is not compulsory except when the animals are being judged, and then only if required by the Judges. Those entered for leaping must be jumped in the Horse Ring at each parade during the Show. Those refusing will be liable to a penalty of 10s. each parade.

40. The inspection of Horses as to soundness is left entirely to the Judges, who may consult the Society's Veterinary Surgeon if they deem it expedient. No protests on veterinary grounds will be received.

41. All Ewes must have reared Lambs in 1884; and Ewes in Sections 3 and 9 (Blackfaced and Cheviot) must be in milk, and have their Lambs at foot.

42. Sheep must have been clipped bare during the season, and the Judges are instructed to examine the fleeces of the Sheep selected for prizes, and to cast those on which they find any of the former fleece. Fleeces must not be artificially coloured.

43. Sows must have reared pigs in 1884 or be in pig; and Pigs must belong to the same litter, and be uncut.

44. In Poultry the Aged Birds must have been hatched previous to, and Cockerels and Pullets in, 1884. No dubbing is allowed in the male birds of the Game Breeds. Those dubbed will not be placed.

45. The Yard will be open for Stock on Monday, 21st July, and between 6 and 10 o'clock on the morning of Tuesday, 22d, after which hour no Stock can be admitted.

46. Bulls must be secured by nose rings, with chains or ropes attached, or with strong halters and double ropes. All cattle must be tied in their stalls.

47. Servants in charge of Stock must bring their own buckets or pails and a piece of rope to carry their forage.

48. Strong loose boxes will be provided for Stallions and Three-and-Two-year-old entire Colts, in which they can remain all night, and loose boxes for Mares with foal at foot; closed-in stables for all the other horses, and covered accommodation for the whole of the other stock.

49. Straw, hay, grass, and tares will be provided free by the Society during the four days of the Show, and half allowance on Monday for any stock that may be in the Yard that day; other kinds of food will be supplied at fixed prices in the forage yard. Any Servant removing bedding from an adjoining stall will be fined in double the amount taken. Exhibitors may fetch their own cake or corn to the Yard, but not grass, tares, hay, nor straw. Coops, food, and attendance for Poultry will be found by the Society.

50. Cattle, Sheep, Swine, or Poultry cannot be removed from the Yard till 5 P.M. on Friday, 25th July, except on certificate by the Veterinary Surgeon employed by the Directors.

51. Horses may be withdrawn at six o'clock each evening on a deposit of £2 for each animal, which shall be forfeited, along with any prize money it may have gained, if the animal is not brought back. They must return at half-past 7 o'clock the following morning, and those not in before 8 will forfeit 10s. Horse passes to be applied for at the Committee Room between 5 and 6 P.M. on Tuesday, and the deposit will be returned between 12.30 and 2.30 on Friday.

52. When the Stock is leaving the Yard, no animal is to be moved till ordered by those in charge of clearing the Yard. Those transgressing this Rule will be detained till all the other Stock is removed.

JUDGING STOCK AND POULTRY.

53. On Tuesday, 22d July, Exhibitors, and all others except Servants in charge of Stock, must leave the Yard at 10 A.M.

54. The Judges will commence their inspection at 11 A.M., when the public will be admitted. The space reserved for the Judges will be enclosed by ropes, and no encroachment will be permitted. In no case shall a Premium be awarded unless the Judges deem the animals to have sufficient merit; and where only one or two lots are presented in a section, and the Judges consider them unworthy of the premiums offered, it shall be in their power to award a lower prize, or to suggest the removal of any lot which appears to them unworthy of being placed in the Yard.

55. In addition to the Premiums, the Judges are authorised to award three Commendations in each section (except Poultry, where only two prizes are to be awarded) if the entries are numerous and the animals of sufficient merit. These Commendations to consist of—Very Highly Commended, Highly Commended, and Commended.

56. The animals in Section 11 (Ayrshire Breed) which have not calved before the Show, will be judged along with the Cows and Heifers in Calf, and those in Section 12 which have calved before the Show will be judged along with Cows in Milk.

57. Two Members of Committee will attend each section of the Judges. It will be their duty to see that no obstruction is offered to them, and that the space reserved for them is not encroached on; to communicate to the Secretary any question that may arise for the consideration of the Committee; to complete their reports; and to ticket the prize animals.

58. It shall not be competent for any Exhibitor, nor for his Factor or Land-Steward, to act as a Judge or attending Member in any class in which he is competing; and no Exhibitor shall remain in charge of any lot, whether belonging to himself or another, while the Judges are at work in the Yard.

DAIRY PRODUCE.

59. Dairy Produce to be entered with the Secretary on or before 4th June. Received in the Showyard on Monday 21st July, and till 10 A.M. on Tuesday 22d July. Judged at 11 A.M. on Tuesday. Exhibited Tuesday, Wednesday, Thursday, and Friday, 22d, 23d, 24th, and 25th July.

60. Dairy Produce must have been made on the Exhibitor's farm in 1884. At least 1 cwt. of the variety of Butter, and 2 cwt. of that of the Cheese exhibited, must have been made during the season. The lots must be fair samples, and untasted. No lot can be removed from the Yard till 5 P.M. on Friday 25th July.

STALL RENT.

61. The following rates shall be paid by Exhibitors when making their Entries:—

	Members.		Non-Members.	
	s.	*d.*	*s.*	*d.*
Cattle, each,	15	0	25	0
Loose boxes for Stallions—3 and 2 year-old entire Colts, and Mares with Foals at foot,	30	0	40	0
All other Horses, each,	20	0	30	0
Sheep, per pen,	10	0	15	0
Family or Group of Sheep, per pen,	20	0	30	0
Swine, per pen,	15	0	20	0
Poultry, each entry,	3	0	5	0
Dairy Produce, each entry,	4	0	6	0
Covered Booths for offices, 9 feet by 9 feet,	70	0	100	0
Newspaper offices, £2, 10s.				

IMPLEMENTS AND OTHER ARTICLES.

62. Implements to be entered with the Secretary on or before 21st May Received in the Yard on Tuesday 15th July, and till 10 o'clock on the morning of Tuesday 22d July. Exhibited Tuesday, Wednesday, Thursday, and Friday, 22d, 23d, 24th, and 25th July. The Schedule of entry must be filled up so far as within the knowledge of the Exhibitor, and prices must be stated.

63. No Money Prizes or Medals will be given for Implements of any kind, and no inspection of them by Judges will take place, except those specified at page 18.

64. Agricultural Implements, and Implements and collections of articles

not Agricultural, will be received for Exhibition, but the Secretary will be entitled to refuse Entries from dealers in articles not deemed worthy of Exhibition.

65. Implements will be placed in the following sections, viz.:—1st, Under Cover, for Agricultural Implements; 2nd, Open, for Agricultural Implements; 3rd, for Exhibits not Implements of Husbandry, which will be placed apart from the Agricultural Implements, either under cover or open, as may be deemed necessary by the Secretary; 4th, Motion Yard. Exhibitors must specify the space they require.

66. The articles of each Exhibitor will be all placed in one stand, except implements in motion, and must not on any account extend beyond the width allowed. No article to be moved out of its stand, or the stand dismantled, till the termination of the Show, at 5 P.M., on Friday 25th July. Those infringing this rule will be reported to the Directors.

67. Exhibitors must arrange their own articles *within* the space allotted to them before 11 o'clock on Tuesday the 22d July, and to the satisfaction of those in charge of the Implement Yard.

68. Exhibitors must on no account leave their stands during the judging of Stock, and if found in the Stock Yard they will be fined 10s.

69. All Machines requiring steam or fire must be entered as such in the Certificate, and will be placed in the Motion Yard. Coke must be used in all cases where fire is required.

70. No Steam Engine shall be driven in the Yard at a greater speed than 4 miles an hour.

71. Locomotive and Traction Engines and other Machines must not be moved from their places without permission of the Secretary, and must not leave their stands till 5.30 P.M. on Friday.

72. There must be attached to each Implement, when forwarded to the Show, a label bearing the Exhibitor's name, and that of the Implement.

73. The carriage of all Implements must be prepaid.

STALL RENT.

74. No smaller space than 6 feet frontage, 20 feet deep (in Motion Yard 50 feet deep), can be allowed for Implements, and, except for exhibits not agricultural, no boarding shall exceed 4 feet in height.

75. The following rates shall be paid by Exhibitors when making their Entries :—

	Members.	Non-Members.
Implement Shedding, 20 feet deep 9 feet high, per foot,	£0 3 0	£0 4 0
Implements without Shedding, 20 feet deep, per foot,	0 2 0	0 3 0
Implement Shedding in Motion Yard, 20 feet deep, with 30 feet open space behind, per foot,	0 4 6	0 7 0
Implements in Motion Yard, without Shedding, 50 feet deep, per foot,	0 2 6	0 5 0
Covered Booths for offices, 9 feet by 9 feet, each,	3 10 0	5 0 0
Newspaper offices, each, £2, 10s.		

ADMISSION TO YARD.

The public will be admitted on Tuesday, 22d July, at 11 A.M., when the inspection by the Judges commences. The charges will be—Tuesday, from 11 A.M. till 5 P.M., 5s.; Wednesday, from 8 A.M. till 5 P.M., 3s.; Thursday, from 8 A.M. till 5 P.M., 2s.; Friday, from 8 A.M. till 5 P.M., 1s.

Members of the Society are admitted to the Showyard without payment, on exhibiting a "*Member's Ticket*," which is strictly not transferable. Tickets will be sent to all Members residing in the United Kingdom whose addresses are known, and on no account will duplicates be issued. All Members not producing their tickets must pay at the gate, and the admission-money will not be returned.

Exhibitors of Stock (not Members) will be charged 5s. for admission to the judging on Tuesday; on Wednesday at 8 A.M., and throughout the Show they will be admitted free.

Exhibitors of Implements and their attendants will be entitled to free entry during the Show, but must remain at their stalls during the judging of the Stock on Tuesday.

Tickets for attendants on Stock and Implements are not available to admit to the Yard between 11 A.M. and 5 P.M.; and any attendant requiring to leave the Yard during the day, cannot be again admitted except by a special pass (to be applied for at the Committee Room), which must be given up on his return.

Placards are prohibited both inside the Showyard and on the outside of the Boundary Fence, with the exception of those belonging to Exhibitors, whose right is confined to their own stalls. No newspapers or any other article allowed to be carried about the Yard for sale. No strolling bands admitted.

No Carriages or Equestrians admitted without special leave from the Directors, and then only for Invalids. Bath chairs may be brought in.

Premium Lists, Regulations, and Certificates of Entry, may be obtained by applying at the Secretary's Office, No. 3 George IV. Bridge, Edinburgh.

All Communications should be addressed to FLETCHER NORTON MENZIES, Esq., *Secretary of the Highland and Agricultural Society of Scotland, No. 3 George IV. Bridge, Edinburgh.*

LAST DAYS OF ENTRY.

IMPLEMENTS—21st MAY.
STOCK AND ALL OTHER ENTRIES—4th JUNE.

RAILWAY ARRANGEMENTS.

The Scotch Railway Companies have adopted the following Regulations.

BY PASSENGER TRAIN.

1. Live Stock *to* the Show to be charged ordinary rates.
2. Live Stock *from* the Show, *if sold*, to be charged ordinary rates.
3. Live Stock *from* the Show, *if unsold*, to be conveyed at half rates back to the station whence they were sent, on production of a certificate from the Secretary of the Agricultural Show to the effect that they are really unsold: failing production of such certificate, ordinary rates must be charged. The reduction to half-rate is to be allowed only when the animals are returned by the same route as that by which they were conveyed to the Show.

If the unsold Live Stock which was conveyed on the outward journey by Goods Train in cattle trucks be required to be returned by Passenger Train in horse-boxes, half the Passenger Train rates must be charged.

4. HORSES—By Passenger or Special Train.
   (*a*) A Stallion to be charged the rate for one Horse, plus 50 per cent.
   (*b*) Any other Horse, for which the exclusive use of a horse-box is *ordered*, to be charged the rate for one horse, plus 50 per cent.
   (*c*) Other Horses to be charged at ordinary rates.
5. BULLS, COWS, AND OTHER ANIMALS—
   (*a*) A Bull, Cow, or other animal sent in a horse-box, and for which the exclusive use of the box *has been ordered*, to be charged the rate for three Horses. (Highland Railway, plus 25 per cent.)
   (*b*) Bulls, Cows, or other animals sent in horse-boxes, but for which

the exclusive use of the box *has not been ordered*, to be charged each the rate for one Horse, plus 50 per cent. (Highland Railway, plus 25 per cent.)

6. Unsold Live Stock transferred from one Agricultural Show to another, in another part of the country, must be charged ordinary rates.

7. Poultry.—The Companies give notice that they are not common carriers of poultry; they will, however, to accommodate the public, carry such by special agreement only, and at special rates, to be obtained at the Companies' stations.

8. Provender conveyed to Agricultural Shows with Live Stock is to be charged ordinary rates, except so much of the same as may be required on the journey.

9. Dogs to be charged full rates both ways.

10. All the above to be carried at owners' risk.

11. Collection and delivery to be performed in all cases by the owners.

12. Men, certified by the owners to be *bona fide* in charge of Live Stock, to be conveyed free in the same train as the animals, as follows :—

One man for each consignment, except when the consignment requires more than one vehicle, when one man for each vehicle may be sent free.

Note.—*Upon both the outward and homeward journey a separate certificate must be given, which must be retained by the station master at the outward or homeward starting-point, as the case may be.*

13. For men in charge of Horses or other Live Stock forwarded by Passenger Train, no separate pass must be issued; the only form of pass must be the endorsement of the station clerk written across the horse ticket, which must be delivered up on the arrival of the animals at their destination.

By Goods Train.

Live Stock.

1. Live Stock *to* the Show to be charged ordinary rates.

2. Live Stock *from* the Show, *if sold*, to be charged ordinary rates.

3. Live Stock *from* the Show, *if unsold*, to be conveyed at half rates back to the station whence they were sent, on production of a certificate from the Secretary of the Agricultural Show to the effect that they are really unsold; failing production of such certificate, ordinary rates must be charged. The reduction to half-rate is to be allowed only when the animals are returned by the same route as that by which they were conveyed *to* the Show.

If the unsold Live Stock which was conveyed on the outward journey by Passenger Train in horse-boxes be required to be returned by Goods Train in cattle trucks, half the Goods Train rates must be charged.

4. Live Stock rates are "station to station" only.

5. Unsold Live Stock transferred from one Agricultural Show to another, in another part of the country, must be charged ordinary rates.

6. Poultry.—The Companies give notice that they are not common carriers of poultry. They will, however, to accommodate the public, carry such by special agreement only, and at special rates, to be obtained at the Companies' stations.

7. Horse-boxes must not be provided for the carriage of Live Stock sent by Goods Train and invoiced at Goods Train rates.

8. Provender conveyed to Agricultural Shows with Live Stock is to be charged ordinary rates, except so much of the same as may be required on the journey.

9. Men, certified by the owners to be *bona fide* in charge of Live Stock, to be conveyed free in the same train as the animals; the number not to exceed one man to each vehicle.

Note.—*Upon both the outward and homeward journey a separate cer-*

tificate must be given, which must be retained by the station master at the outward or homeward starting-point, as the case may be.

10. For men in charge of Live Stock forwarded by Goods Train, no separate pass must be issued, but the form of pass must be printed on the Live Stock Ticket, which must be delivered up on the arrival of the Live Stock at their destination.

Agricultural Machines and Implements.

The application of the following Regulations for the conveyance of Agricultural Implements should not be extended to articles other than implements of husbandry :—

11. Agricultural Machines and Implements *to* the Show to be charged ordinary rates.

12. Agricultural Machines and Implements *from* the Show, *if sold*, to be charged ordinary rates.

13. Agricultural Machines and Implements *from* the Show, *if unsold*, to be conveyed at half rates back to the station whence they were sent, on production of a certificate from the Secretary of the Agricultural Show to the effect that they are really unsold ; failing production of such certificate, ordinary rates must be charged. The reduction to half-rate is to be allowed only when the articles are returned by the same route as that by which they were conveyed to the Show.

14. Unsold goods transferred from one Agricultural Show to another, in another part of the country, must be charged ordinary rates.

15. Agricultural Societies' Show Plant must be charged at Special Class rates, station to station.

16. All the above to be carried at owners' risk.

17. Collection and delivery to be performed in all cases by the owners.

PREMIUMS.

In addition to the Premiums, the Judges are authorised to award three Commendations in each section (except Poultry, where only two prizes are to be awarded) if the entries are numerous, and the animals of sufficient merit. These Commendations to consist of—Very Highly Commended, Highly Commended, and Commended.

All former prize animals are eligible to compete.

Animals competing for the family prizes may be drafted from the regular classes.

CLASS I.

CATTLE.		Given by Highland Society.	Added by Subscribers	Total.
SHORTHORN.		£	£	£
Section 1. Bull calved before 1st Jan. 1882,	1st Prize	20	...	20
	2nd ,,	10	...	10
	3rd ,,	5	...	5
Breeder of best Bull,—The Silver Medal.				
2 Bull calved on or after 1st Jan. 1882,	1st Prize	20	...	20
	2nd ,,	10	...	10
	3rd ,,	5	...	5
Carry forward,		£70	...	£70

SHORTHORN—*continued.*		Given by Highland Society.	Added by Subscribers	Total.
		£	£	£
Brought forward.		70	...	70
Section 3. Bull calved on or after 1st Jan, 1883,	1st Prize	10	5	15
	2nd "	5	3	8
	3rd "	3	2	5
4. Cow of any age, . . .	1st Prize	15	5	20
	2nd "	8	2	10
	3rd "	4	1	5
5. Heifer calved on or after 1st Jan. 1882,	1st Prize	10	10	20
	2nd "	5	5	10
	3rd "	3	2	5
6. Heifer calved on or after 1st Jan. 1883,	1st Prize	8	7	15
	2nd "	4	4	8
	3rd "	2	3	5
7. Family,—Cow and Three or more of her descendants (male or female) in the female line, oxen excluded, bred by, or the property of, the exhibitor (see Rule No. 32), ...	1st Prize	20	...	20
	2nd "	10	...	10
	3rd "	5	...	5
8. Group of one Bull above one year, one Cow, one two year old Heifer, and one Yearling (see Rule No. 32), . .	1st Prize	...	30	30
	2nd "	...	20	20
	3rd "	...	6	6
Cup for best Male animal,*		...	50	50
Cup for best Female animal,*		...	50	50
		£182	£205	£387
AYRSHIRE.				
Section 9. Bull calved before 1st Jan. 1882, .	1st Prize	20	...	20
	2nd "	10	...	10
	3rd "	5	...	5
Breeder of best Bull,—The Silver Medal.				
10. Bull calved on or after 1st Jan. 1882,	1st Prize	20	...	20
	2nd "	10	...	10
	3rd "	5	...	5
11. Bull calved on or after 1st Jan. 1883,	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	3	...	3
12. Cow in Milk, of any age, . .	1st Prize	15	...	15
	2nd "	8	...	8
	3rd "	4	...	4
13. Cow in Calf, of any age, or Heifer in Calf, calved before 1st Jan. 1882, .	1st Prize	15	...	15
	2nd "	8	...	8
	3rd "	4	...	4
Carry forward,		£142	...	£142

* Given by the Shorthorn Society of Great Britain and Ireland.

AYRSHIRE—*continued.*		Given by Highland Society.	Added by Subscribers	Total.
		£	£	£
Brought forward,		142	...	142
Section 14. Heifer calved on or after 1st Jan. 1882,	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	3	...	3
15. Heifer calved on or after 1st Jan. 1883,	1st Prize	8	...	8
	2nd "	4	...	4
	3rd "	2	...	2
16. Family,—Cow and Three or more of her descendants (male or female) in the female line, oxen excluded, bred by, or the property of, the exhibitor (see Rule No. 32), ...	1st Prize	20	...	20
	2nd "	10	...	10
	3rd "	5	...	5
Cups for best and second best Male animal,* . . .	1st Prize	...	20	20
	2nd "	...	10	10
Cups for best and second best Female animal,* . .	1st Prize	...	20	20
	2nd "	...	10	10
		£209	£60	£269
POLLED ANGUS OR ABERDEEN.				
Section 17. Bull calved before 1st Dec. 1881, .	1st Prize	20	...	20
	2nd "	10	...	10
	3rd "	5	...	5
Breeder of best Bull,—The Silver Medal.				
18. Bull calved on or after 1st Dec. 1881,	1st Prize	20	...	20
	2nd "	10	...	10
	3rd "	5	...	5
	4th "	...	3	3
	5th "	...	2	2
19. Bull calved on or after 1st Dec. 1882,	1st Prize	10	5	15
	2nd "	5	3	8
	3rd "	3	2	5
	4th "	...	3	3
	5th "	...	2	2
20. Cow of any age, . . .	1st Prize	15	...	15
	2nd "	8	...	8
	3rd "	4	...	4
	4th "	...	3	3
	5th "	...	2	2
21. Heifer calved on or after 1st Dec. 1881,	1st Prize	10	2	12
	2nd "	5	2	7
	3rd "	3	2	5
	4th "	...	3	3
	5th "	...	2	2
Carry forward,		£133	£36	£169

* Given by the Ayrshire Cattle Herd Book Society. The animals competing for these Cups must be entered in the Ayrshire Herd Book. The winners of the £10 Prizes may either take money or cup.

POLLED ANGUS or ABERDEEN—*continued.*		Given by Highland Society.	Added by Subscribers	Total.
		£	£	£
Brought forward,		133	36	169
Section	1st Prize	8	2	10
	2nd "	4	2	6
22. Heifer calved on or after 1st Dec. 1882,	3rd "	2	2	4
	4th "	...	3	3
	5th "	...	2	2
23. Family,—Cow and Three or more of her descendants (male or female) in the female line, oxen excluded, bred by, or the property of, the exhibitor (see Rule No. 32),	1st Prize	20	10	30
	2nd "	10	10	20
	3rd "	5	5	10
24. Group of not less than one Bull over one year old, and of not less than four Female animals of any age (see Rule No. 32),	1st Prize	...	30	30
	2nd "	...	20	20
	3rd "	...	10	10
Cup for best Male animal,*		...	26, 5s.	26, 5s.
Cup for best Female animal,*		...	26, 5s.	26, 5s.
		£182	£184, 10s	£366, 10s
GALLOWAY.				
Section	1st Prize	20	...	20
25. Bull calved before 1st Jan. 1882,	2nd "	10	...	10
	3rd "	5	...	5
Breeder of best Bull—The Silver Medal.				
	1st Prize	20	...	20
	2nd "	10	...	10
26. Bull calved on or after 1st Jan. 1882,	3rd "	5	...	5
	4th "	...	3	3
	5th "	...	2	2
	1st Prize	10	5	15
	2nd "	5	3	8
27. Bull calved on or after 1st Jan. 1883,	3rd "	3	2	5
	4th "	...	3	3
	5th "	...	2	2
	1st Prize	15	..	15
	2nd "	8	...	8
28. Cow of any age,	3rd "	4	...	4
	4th "	...	3	3
	5th "	...	2	2
	1st Prize	...	10	10
29. Cow calved on or after 1st Jan. 1881,	2nd "	...	5	5
	3rd "	...	3	3
Carry forward,		£115	£43	£158

* Given by the Polled Cattle Society.

GALLOWAY—*continued.*		Given by Highland Society.	Added by Subscribers	Total.
		£	£	£
	Brought forward,	145	43	158
Section	1st Prize	10	2	12
	2nd "	5	2	7
30. Heifer calved on or after 1st Jan. 1882	3rd "	3	2	5
	4th "	...	3	3
	5th "	...	2	2
	1st Prize	8	2	10
	2nd "	4	2	6
31. Heifer calved on or after 1st Jan. 1883	3rd "	2	2	4
	4th "	...	3	3
	5th "	...	2	2
32. Family,—Cow and three or more of her descendants (male or female) in the female line, oxen excluded, bred by, or the property of, the exhibitor (see Rule No. 32), ...	1st Prize	20	10	30
	2nd "	10	10	20
	3rd "	5	5	10
33. Group of not less than one Bull over one year old, and of not less than four female animals of any age (see Rule No. 32), ...	1st Prize	...	30	30
	2nd "	...	20	20
	3rd "	...	10	10
Cup for best Male animal,* .		...	26, 5s.	26, 5s.
Cup for best Female animal,† .		...	26, 5s.	26, 5s.
		£182	£202, 10s	£384, 10s
HIGHLAND.				
Section.	1st Prize	20	...	20
34. Bull calved before 1st Jan. 1881, .	2nd "	10	...	10
	3rd "	5	...	5
Breeder of Best Bull—The Silver Medal.				
	1st Prize	20	...	20
35. Bull calved on or after 1st Jan. 1881,	2nd "	10	...	10
	3rd "	5	...	5
	1st Prize	10	...	10
36. Bull calved on or after 1st Jan. 1882,	2nd "	5	. .	5
	3rd "	3	...	3
	1st Prize	15	...	15
37. Cow of any age, ...	2nd "	8	...	8
	3rd "	4	...	4
	1st Prize	10	...	10
38. Heifer calved on or after 1st Jan. 1881	2nd "	5	...	5
	3rd "	3	...	3
Carry forward,		£133	...	£133

* Given by the Galloway Cattle Society.
† Given by Breeders of Galloway Cattle.

HIGHLAND—*continued.*		Given by Highland Society.	Added by Subscribers	Total.
		£	£	£
Section	Brought forward,	133	...	133
39. Heifer calved on or after 1st Jan. 1882	1st Prize	8	...	8
	2nd "	4	...	4
	3rd "	2	...	2
40. Family,—Cow and Three or more of her descendants (male or female) in the female line, oxen excluded, bred by, or the property of, the exhibitor (see Rule No. 32),	1st Prize	20	...	20
	2nd "	10	...	10
	3rd "	5	...	5
Cups for best and second best Male animal,	1st Prize	...	25	25
	2nd "	...	15	15
Cups for best and second best Female animal,	1st Prize	...	25	25
	2nd "	...	15	15
		£182	£80	£262
FAT STOCK.				
41. Highland Ox calved before 1st Jan. 1881,	1st Prize	6	...	6
	2nd "	3	...	3
42. Highland Ox calved on or after 1st Jan. 1881,	1st Prize	5	...	5
	2nd "	2	...	2
Cup for best Ox in the above sections, value not yet fixed,		...	...	...
		£16	...	£16

CLASS II.

HORSES.		Given by Highland Society.	Added by Clydesdale Horse Society.	Total.
		£	£	£
FOR AGRICULTURAL PURPOSES.				
Section 1. Stallion foaled before 1st Jan. 1881,	1st Prize	30		
	2nd "	20		
	3rd "	10		
	4th "	5		
Breeder of best Stallion,—The Silver Medal.			25*	140
2 Entire Colt foaled on or after 1st Jan. 1881,	1st Prize	20		
	2nd "	15		
	3rd "	10		
	4th "	5		
Carry forward,		£115	£25	£140

* For best Stallion, three years old and upwards.

HORSES—*continued.*		Given by Highland Society.	Added by Clydesdale Horse Society.	Total
		£	£	£
Brought forward,		115	25	140
Section 3. Entire Colt foaled on or after 1st Jan. 1882,	1st Prize	15		
	2nd "	8		
	3rd "	4		
	4th "	2		
			10*	61
4. Entire Colt foaled on or after 1st Jan. 1883,	1st Prize	10		
	2nd "	6		
	3rd "	4		
	4th "	2		
5. Mare (with Foal at foot) foaled before 1st Jan. 1881,	1st Prize	25		
	2nd "	15		
	3rd "	10		
	4th "	5		
6. Mare (in Foal) foaled before 1st Jan. 1881,	1st Prize	20		
	2nd "	10		
	3rd "	5	25†	147
	4th "	3		
7. Filly foaled on or after 1st Jan. 1881,	1st Prize	15		
	2nd "	8		
	3rd "	4		
	4th "	2		
8. Filly foaled on or after 1st Jan. 1882,	1st Prize	10		
	2nd "	5		
	3rd "	3		
	4th "	2		
			10‡	45
9. Filly foaled on or after 1st Jan. 1883.	1st Prize	8		
	2nd "	4		
	3rd "	2		
	4th "	1		
10. Family,—Five animals, foaled in 1882 (male or female, the offspring of one sire), not necessarily the property of one person,	1st Prize	20	...	20
	2nd "	15	...	15
	3rd "	10	...	10
11. Do. Do., foaled in 1883, do. do.,	1st Prize	20	...	20
	2nd "	15	...	15
	3rd "	10	...	10
In sections 10 and 11 the prizes to go to the owner of the sire.				
Carry forward,		£413	£70§	£483

* For best Colt in the two year old and one year old sections.
† For best Mare, three years old and upwards.
‡ For best Filly in the two year old and one year old sections.
§ Animals competing for these premiums, which will be given in Cups, must be registered in the Clydesdale Stud Book, or the Exhibitor must produce a certificate from the Secretary of the Clydesdale Horse Society that the entry of the pedigree has been accepted.

HORSES—*continued.*		Given by Highland Society.	Added by Clydesdale Horse Society.	Total.
		£	£	£
Section	Brought forward,	413	70	483
12. Draught Gelding foaled before 1st Jan. 1881,	1st Prize	8	...	8
	2nd "	4	...	4
	3rd "	2	...	2
13. Draught Gelding foaled on or after 1st Jan. 1881,	1st Prize	6	...	6
	2nd "	3	...	3
	3rd "	1	...	1
		£437	£70	£507
HUNTERS.				
			Given by Subscribers.	
14. Thoroughbred Stallion, suitable for getting Hunters.	1st Prize	...	40 *	40
	2nd "	...	20 *	20
15. Brood Mare, with foal at foot,	1st Prize	...	25 †	25
	2nd "	...	15 †	15
	3rd "	...	10 †	10
16. Mare or Gelding, five years and upwards, up to 16 stone,	1st Prize	...	50 ‡	50
	2nd "	...	25 ‡	25
	3rd "	...	15 ‡	15
17. Mare or Gelding, five years and upwards, up to 14 stone,	1st Prize	...	50 §	50
	2nd "	...	25 §	25
	3rd "	15	...	15
18. Mare or Gelding, five years and upwards, up to 12 stone,	1st Prize	...	50 ‖	50
	2nd "	...	25 ‖	25
	3rd "	...	15 ‖	15
19. Mare or Gelding, four years, up to 14 stone,	1st Prize	...	30 ¶	30
	2nd "	...	20 ¶	20
	3rd "	10	...	10
20. Mare or Gelding, four years, up to 12 stone,	1st Prize	...	30**	30
	2nd "	20	...	20
	3rd "	10	...	10
21. Mare or Gelding, three years, likely to make a hunter,	1st Prize	25	...	25
	2nd "	15	...	15
	3rd "	10	...	10
22. Stallion, Mare or Gelding for Leaping,	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	3	...	3
		£123	£445	£568

* Given by The Earl of Eglinton's, Renfrewshire, and Dunfriesshire Hunts.
† Given by the Edinburgh Agricultural Association.
‡ Given by Linlithgow and Stirlingshire Hunt.
§ Given by The Duke of Buccleuch's Hunt.
‖ Given by The Earl of Eglinton's, Renfrewshire, and Dumfriesshire Hunts.
¶ Given by the Berwickshire Hunt.
** Given by Fife Hunt.

HORSES—*continued.*		Given by Highland Society.	Given by Subscribers	Total.
		£	£	£
ROADSTERS.				
Section				
23. Mare or Gelding for Carriage, foaled before 1st Jan. 1880, . . .	1st Prize	20	...	20
	2nd "	10	...	10
	3rd "	5	...	5
24. Mare or Gelding, Hackney or Roadster, between 14 and 15 hands, .	1st Prize	8	...	8
	2nd "	4	...	4
	3rd "	2	...	2
25. Hackney Stallion, ...		...	10*	10
		£49	£10	£59
PONIES.				
26. Stallion, 15 hands and under, .	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	3	...	3
27. Mare or Gelding, between 13 and 14½ hands, ...	1st Prize	6	..	6
	2nd "	3	...	3
	3rd "	1	..	1
28. Mare or Gelding, between 12½ and 14 hands, ...	1st Prize	6	...	6
	2nd "	3	...	3
	3rd "	1	...	1
29. Mare or Gelding, under 12½ hands,.	1st Prize	6	...	6
	2nd "	3	...	3
	3rd "	1	...	1
		£48	...	£48

* Given by Members of the Hackney Stud Book Society. Animals competing for this Prize must be entered in Volume I. of the Hackney Stud Book, or have been accepted for Volume II.

STALLIONS FOR AGRICULTURAL PURPOSES.

Stallions to serve in the three counties connected with the Show in Season 1884, to be divided equally amongst them, . . . £100

Competition to take place in Spring.

CLASS III.

SHEEP.		Given by Highland Society.	Added by Subscribers	Total.
		£	£	£
BLACKFACED.				
Section 1. Tup above one shear . .	1st Prize	15		
	2nd "	10		
	3rd "	7		
	4th "	4	10*	82
2. Shearling Tup, . .	1st Prize	15		
	2nd "	10		
	3rd "	7		
	4th "	4		
3. Three Ewes above one shear, with their Lambs at foot, ...	1st Prize	10		
	2nd "	5		
	3rd "	2	10*†	44
4. Three Shearling Ewes or Gimmers, .	1st Prize	10		
	2nd "	5		
	3rd "	2		
5. Family group of Aged Tup, Shearling Tup, three Ewes with their Lambs at foot, and three Gimmers, the property of the Exhibitor. No Exhibitor allowed to make more than one entry.	1st Prize	...	25	25
	2nd "	...	20	20
	3rd "	...	15 *	15
	4th "	...	10	10
	5th "	...	5	5
6. Family of 2 two Shear Tups, two Shearling Tups, and four Tup Lambs, all bred by and the property of Exhibitor, the two Shear Tups to have been used in his flock during season 1883. The animals competing for this prize not to be entered in any of the other sections, .	...	...	30‡	30
7. Best Tup Lamb in the yard, . .	...	...	20‡	20
		£106	£145	£251
CHEVIOT.				
8. Tup above one shear, . . .	1st Prize	15	...	15
	2nd "	10	...	10
	3rd "	7	...	7
	4th "	4	...	4
9. Shearling Tup, . . .	1st Prize	15	...	15
	2nd "	10	...	10
	3rd "	7	...	7
	4th "	4	...	4
Carry forward,		£72	...	£72

* Given by Breeders of Blackfaced Sheep.
† For best 3 Ewes with their Lambs at foot, or Gimmers.
‡ Given by West Country Breeders of Blackfaced Sheep.

SHEEP—*continued.*		Given by Highland Society.	Added by Subscribers	Total.
		£	£	£
Section	Brought forward,	72	...	72
10. Three Ewes above one shear, with their Lambs at foot,	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	2	...	2
11. Three Shearling Ewes or Gimmers,	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	2	...	2
12. Family Group of aged Tup, Shearling Tup, three Ewes with their Lambs at foot, and three Gimmers, all bred by exhibitor with the exception of the aged Tup, which, if not bred by exhibitor, must have been used by him in his flock for one season.	1st Prize	...	25	25
	2nd "	...	10	10
	3rd "	...	5	5
		£106	£40	£146
BORDER LEICESTER.				
Tweeddale Gold Medal, for best Tup,		20		
13. Tup above one shear,	1st Prize	12	...	12
	2nd "	8	...	8
	3rd "	4	...	4
14. Shearling Tup,	1st Prize	12	...	12
	2nd "	8	...	8
	3rd "	4	...	4
15. Three Ewes above one shear,	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	2	..	2
16. Three Shearling Ewes or Gimmers,	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	2	...	2
17. Family of Tup above one shear, three Shearling Tups, three Ewes above one shear, three Gimmers, three Tup Lambs, and three Ewe Lambs, all to be the property of exhibitor, and all bred by him, with the exception of the aged Tup, which, if not his breeding, must have been used by him for at least one season.	1st Prize	...	50	50
	2nd "	12	13	25
	3rd "	8	4	12
	4th "	4	1	5
		£126	£68	£194
LONG-WOOLLED OTHER THAN BORDER LEICESTER.				
18. Tup above one shear,	1st Prize	3	...	3
	2nd "	2	...	2
19. Shearling Tup,	1st Prize	3	...	3
	2nd "	2	...	2
	Carry forward,	£10	...	£10

SHEEP—*continued.*		Given by Highland Society.	Added by Subscribers	Total.
		£	£	£
Section.	Brought forward,	10	...	10
20. Three Ewes above one shear,	1st Prize	3	...	3
	2nd "	2	...	2
21. Three Shearling Ewes or Gimmers,	1st Prize	3	...	3
	2nd "	2	...	2
		£20	...	£20
SHROPSHIRE.				
22. Tup above one shear,	1st Prize	10	...	10
	2nd "	5	...	5
	3rd "	3	...	3
23. Shearling Tup,	1st Prize	10	15	25
	2nd "	5	...	5
	3rd "	3	...	3
24. Three Ewes above one shear,	1st Prize	8	...	8
	2nd "	4	...	4
	3rd "	2	...	2
			15*	
25. Three Shearling Ewes or Gimmers,	1st Prize	8	...	23
	2nd "	4	...	4
	3rd "	2	...	2
26. Family Group of aged Tup, Two Shearling Tups, three Ewes, three Gimmers, three Tup Lambs, and three Ewe Lambs, all bred by exhibitor, except aged Tup, which must have been used by him for at least one season. This cup is confined to Scotch exhibitors.	...	...	20	20
		£64	£50	£114
SHORT-WOOLLED OTHER THAN SHROPSHIRE.				
27. Tup above one shear,	1st Prize	3	...	3
	2nd "	2	...	2
	3rd "	1	...	1
28. Shearling Tup,	1st Prize	3	...	3
	2nd "	2	...	2
	3rd "	1	...	1
29. Three Ewes above one shear,	1st Prize	3	...	3
	2nd "	2	...	2
	3rd "	1	...	1
30. Three Shearling Ewes or Gimmers,	1st Prize	3	...	3
	2nd "	2	...	2
	3rd "	1	...	1
		£24	...	£24

* For best 3 Ewes or Gimmers.

SHEEP—*continued.*		Given by Highland Society.	Given by Subscribers	Total.
		£	£	£
OXFORD DOWN.				
Section				
31. Tup above one shear, ...		...	3	3
32. Shearling Tup, ...		...	3	3
33. Three Ewes above one shear, ...		...	3	3
34. Three Shearling Ewes or Gimmers, ...		...	3	3
		...	£12	£12
HALF-BRED SHEEP.*				
35. Tup above one shear, . .	1st Prize	...	8	8
	2nd "	...	5	5
	3rd "	...	2	2
	4th "	...	1	1
36. Shearling Tup, . . .	1st Prize	...	8	8
	2nd "	...	5	5
	3rd "	...	2	2
	4th "	...	1	1
37. Three Ewes above one shear, .	1st Prize	...	8	8
	2nd "	. .	5	5
	3rd "	..	2	2
	4th "	...	1	1
38. Three Shearling Ewes or Gimmers, .	1st Prize	...	8	8
	2nd "	...	5	5
	3rd "	...	2	2
	4th "	...	1	1
39. Three Ewe Lambs, . . .	1st Prize	...	8	8
	2nd "	...	5	5
	3rd "	...	2	2
	4th "	...	1	1
		...	£80	£80
BLACK-FACED WETHERS.				
40. Three Wethers above two shear, .	1st Prize	...	8	8
	2nd "	...	5	5
	3rd "	...	3	3
41. Three Wethers two shear and under,	1st Prize	...	5	5
	2nd "	...	3	3
Gold Medal for best three Wethers in the above sections, value not yet fixed, ...		...	...	...
		...	£24	£24

* Sanctioned at the request of Breeders.

CLASS IV.—SWINE.

Section	Premiums. 1st. £	2d. £	3d. £	
LARGE BREED.				
1. Boar,	5	3	1	
2. Sow,	4	2	1	
3. Three Pigs, not above 8 months old,	4	2	1	£23
BLACK OR BERKSHIRE.				
4. Boar,	5	3	1	
5. Sow,	4	2	1	
6. Three Pigs, not above 8 months old,	4	2	1	23
SMALL BREED.				
7. Boar,	5	3	1	
8. Sow,	4	2	1	
9. Three Pigs, not above 8 months old,	4	2	1	23
				£69

EXTRA STOCK.

Animals not included in the Sections for Competition may be exhibited as Extra Stock, and will receive Honorary Premiums when specially commended, as follows :—

CATTLE AND HORSES.

Very highly commended,	Medium Gold Medal.
Highly commended,	Minor Gold Medal.
Commended,	The Silver Medal.

SHEEP AND SWINE.

Very highly commended,	Minor Gold Medal.
Highly commended,	The Silver Medal.
Commended,	Medium Silver Medal.

CLASS V.—POULTRY.

First Premium—One Sovereign ; Second Premium—Ten Shillings —in all the Sections of Poultry.

Aged Birds must have been hatched previous to, and Cockerels and Pullets in, 1884.

	Section	Section
Dorking—*Silver Grey*,	1. Cock	2. Hen
	3. Cockerel	4. Pullet
Dorking—*Coloured*,	5. Cock	6. Hen
	7. Cockerel	8. Pullet

	Section	Section
Cochin-China, . .	9. Cock	10. Hen
	11. Cockerel	12. Pullet
Bramahpootra, . .	13. Cock	14. Hen
	15. Cockerel	16. Pullet
Spanish, ...	17. Cock	18. Hen
	19. Cockerel	20. Pullet
Scotch Grey, . . .	21. Cock	22. Hen
	23. Cockerel	24. Pullet
Hamburg, . . .	25. Cock	26. Hen
	27. Cockerel	28. Pullet
Any other Pure Breed,	29. Cock	30. Hen
	31. Cockerel	32. Pullet
Game — *Black or Brown Reds*, ...	33. Cock	34. Hen
	35. Cockerel	36. Pullet
Game — *Any other Pure Breed*, ...	37. Cock	38. Hen
	39. Cockerel	40. Pullet
Bantams — *Any Pure Breed*, . . .	41. Cock	42. Hen
	43. Cockerel	44. Pullet
Ducks—*White Aylesbury*,	45. Drake	46. Duck
	47. Drake (Young)	48. Duckling
Ducks—*Rouen*, . .	49. Drake	50. Duck
	51. Drake (Young)	52. Duckling
Ducks—*Any other Pure Breed*, ...	53. Drake	54. Duck
	55. Drake (Young)	56. Duckling
Turkeys—*Any Pure Breed*,	57. Cock	58. Hen
	59. Cock (Poult)	60. Hen (Poult)
Geese—*Any Pure Breed*,	61. Gander	62. Goose
	63. Gander (Young)	64. Gosling

Amount of Poultry Premiums, £96.

CLASS VI.—DAIRY PRODUCE.

Section	Premiums. 1st. £	2d. £	3d. £
1. Cured Butter, not less than 7 lbs., . . .	6	4	2
2. Powdered Butter, not less than 7 lbs., . .	6	4	2
3. Fresh Butter, three ½ lb. rolls, . . .	6	4	2
4. Cheddar Cheese, 56 lbs. and upwards, . .	8	6	3
5. Cheddar Cheese, 14 lbs. and under, . .	4	2	1
6. Dunlop or Flat Cheese, 30 lbs. and upwards, .	6	4	2
7. Cheese, any other variety, 30 lbs. and upwards, .	6	4	2
8. Cheese, any variety, 15 lbs. and under, . .	4	2	1
			£91

WORKING DAIRY.

Arrangements will be made to have a Working Dairy open for the inspection of the Implements used in the separation of Butter and Cream, and in the manufacture of different kinds of Cheese.

CLASS VII.—IMPLEMENTS.

Section	Premiums. 1st.	2d.	
	£	£	
1. Exhaust Fan for Agricultural Purposes, to be worked by hand, horse, or steam power, ...	10	5	
2. Broadcast Manure Distributor, suitable for all kinds of Artificial Manures, ...	20	10	
3. Machine, at a price within ordinary farmers' means of acquisition, adapted for cleaning all sorts of grain and other seeds from weeds, . . .	10	5	
4. Cream and Milk Separator, ...	5	—	
5. Machine for working Butter, ...	5	—	
6. Travelling Steam Engine, suitable for drawing Reaper, Binder, and for other farm work, . . .	20	10	
			£100

REGULATIONS FOR COMPETITIVE TRIALS.

1. Implements to be entered with the Secretary on or before 21st May Received in the Yard on Tuesday, 15th July, and till 10 o'clock on the morning of Tuesday, 22d July. Exhibited Tuesday, Wednesday, Thursday, and Friday, 22d, 23d, 24th, and 25th July.

2. The Society will provide ground near Edinburgh at a suitable season, and make arrangements for the proper trial of the Implements.

3. The price as entered in the Catalogue must be held the same till after the trials are over.

4. Implements must be *bona fide* the manufacture of the exhibitor, and fitted together by him, but portions of the machine or other article exhibited for competition may be purchased from other works.

5. The Premiums will not be awarded without thorough and exhaustive open and competitive trials.

6. Implements selected for trial will be stamped, or otherwise marked for identification by the Society's Engineer, before being removed from the Showyard. No alterations will be allowed on such implements between the time of the Show and the date fixed for the trial.

7. The Committee shall have power to withhold the Prizes where there is not sufficient merit, or to apportion them as they think best.

Reference is made to the General Regulations for the terms on which other Implements and Machines may be exhibited at the Show.

CLASS VIII.—HIGHLAND INDUSTRIES AND FISHERIES.

Section	Premiums. 1st.	2d.	
	£	£	
1. Best Keg of Eels from Scotch loch or stream, to be supplied in quantity at the price quoted, and best and simplest engine of capture, ...	5	—	
2. Best Keg of true Smelts (*Osmerus*), or Sand Smelts (*Atherina*), and Sillocks, caught North of the Forth and Clyde, ...	5	—	
			10
Carry forward, .			£10

Section			£10
	Brought forward,		
3.	Finest show of Mussels. Exhibitor to supply, if required, not less than 100 tons, at a price on East Coast,	5 2	
4.	Best Barrel of White Herring,	5 —	
5.	Best Collection of Dried and Smoked Fish,	8 4	
6.	Best Collection of Apparatus, not a Trawl, for the capture of Sea-fish, not including Salmon,	8 —	
7.	Best Collection of Sea-fishing Tackle,	8 —	
			40
			£50

CLASS IX.—BEE HUSBANDRY.

£20 and 2 Silver Medals have been granted to the Caledonian Apiarian and Entomological Society. Information to be obtained from, and Entries made with, Mr R. J. Bennett, 50 Gordon Street, Glasgow.

ABSTRACT OF PREMIUMS—

Given by the Society—

1.	Cattle,	£953	0	0
2.	Horses,	757	0	0
3.	Sheep, including Tweeddale Gold Medal,	446	0	0
4.	Swine,	69	0	0
5.	Poultry,	96	0	0
6.	Dairy Produce,	91	0	0
7.	Implements,	100	0	0
8.	Highland Industries and Fisheries,	50	0	0
9.	Bee Husbandry,	21	8	0
10.	Six Silver Medals to Breeders,	4	4	0
11.	Extra Stock, say	80	0	0
		£2667	12	0

Given by—

1.	Shorthorn Society,	£100	0	0		
2.	Breeders of Shorthorn Cattle,	105	0	0		
3.	Ayrshire Cattle Herd Book Society,	60	0	0		
4.	Polled Cattle Society,	52	10	0		
5.	Breeders of Polled Cattle,	132	0	0		
6.	Galloway Cattle Society,	26	5	0		
7.	Breeders of Galloway Cattle,	176	5	0		
8.	Breeders of Highland Cattle, Cup and	80	0	0		
9.	Clydesdale Horse Society,	70	0	0		
10.	Subscription Prizes—Hunters,	445	0	0		
11.	Members of Hackney Stud Book Society,	10	0	0		
12.	Breeders of Blackfaced Sheep,	95	0	0		
13.	West Country Breeders of Blackfaced Sheep,	50	0	0		
14.	Breeders of Cheviot Sheep,	40	0	0		
15.	Breeders of Border Leicester Sheep,	68	0	0		
16.	Breeders of Shropshire Sheep,	50	0	0		
17.	Breeders of Oxford Down Sheep in Scotland,	12	0	0		
18.	Breeders of Half-Bred Sheep,	80	0	0		
19.	Feeders of Blackfaced Wethers — Gold Medal, and	24	0	0		
					1676	0 0
					£4343	12 0

HIGHLAND AND AGRICULTURAL SOCIETY.

GENERAL SHOW OF STOCK AND IMPLEMENTS

At ABERDEEN, 1885.

The District connected with the Show comprises the Counties of Aberdeen, Banff, and Kincardine, and Eastern Division of Forfarshire.

Premiums will be offered for the following Classes :—

CATTLE.

SHORTHORN.

The Tweeddale Gold Medal, value £20, will be given for the best Shorthorn Bull in the yard. All former prize animals will be eligible to compete.

Bull calved before 1st January 1883
Bull calved on or after 1st January 1883
Bull calved on or after 1st January.....1884
Cow of any age.
Heifer calved on or after 1st January 1883
Heifer calved on or after 1st January 1884

AYRSHIRE.

Bull calved before 1st January 1883
Bull calved on or after 1st January 1883
Bull calved on or after 1st January 1884
Cow in milk of any age.
Cow in calf of any age, or Heifer in calf calved before 1st January 1883
Heifer calved on or after 1st January 1883
Heifer calved on or after 1st January 1884

POLLED ANGUS OR ABERDEEN.

Bull calved before 1st December 1882
Bull calved on or after 1st December 1882
Bull calved on or after 1st December 1883
Cow calved before 1st December 1881
Cow calved between 1st December 1881 and 1st December 1882
Heifer calved on or after 1st December 1882
Heifer calved on or after 1st December 1883
Family,—Cow and three or more descendants (male or female) in the female line, oxen excluded, bred by or the property of the Exhibitor.

GALLOWAY.

Bull calved before 1st January 1883
Bull calved on or after 1st January 1883
Bull calved on or after 1st January 1884
Cow of any age.
Heifer calved on or after 1st January 1883
Heifer calved on or after 1st January 1884

HIGHLAND.

Bull calved before 1st January 1882
Bull calved on or after 1st January 1882
Bull calved on or after 1st January 1883
Cow of any age.
Heifer calved on or after 1st January 1882
Heifer calved on or after 1st January 1883

HORSES

For Agricultural Purposes.

Stallion foaled before 1st January 1882
Entire Colt foaled on or after 1st January 1882
Entire Colt foaled on or after 1st January 1883
Entire Colt foaled on or after 1st January 1884
Mare with foal at foot, foaled before 1st January 1882
Mare in foal, foaled before 1st January 1882
Filly foaled on or after 1st January.....1882
Filly foaled on or after 1st January.....1883
Filly foaled on or after 1st January.....1884

DRAUGHT GELDINGS.

Draught Gelding foaled before 1st January 1882
Draught Gelding foaled on or after 1st January.....1882

ROADSTERS.

Mare or Gelding, suitable for field, 4 years and upwards.
Mare or Gelding, suitable for carriage, 4 years old and upwards.
Mare or Gelding, suitable as Hackney or Roadster, between 14 and 15½ hands.

PONIES.

Stallion, 15 hands and under.
Mare or Gelding, between 13 and 14½ hands.
Mare or Gelding, between 12½ and 14 hands.
Mare or Gelding, under 12½ hands.

SHEEP.

Ewes and Gimmers to be exhibited in pens of three.

BLACKFACED.

Tup above one shear.
Shearling Tup.
Ewes above one shear.
Shearling Ewes or Gimmers.

CHEVIOT.

Tup above one shear.
Shearling Tup.
Ewes above one shear.
Shearling Ewes or Gimmers.

BORDER LEICESTER.

Tup above one shear.
Shearling Tup.
Ewes above one shear.
Shearling Ewes or Gimmers.

LONG-WOOLLED OTHER THAN BORDER LEICESTER.

Tup above one shear.
Shearling Tup.
Ewes above one shear.
Shearling Ewes or Gimmers.

SHROPSHIRE.

Tup above one shear.
Shearling Tup.
Ewes above one shear.
Shearling Ewes or Gimmers.

SHORT-WOOLLED OTHER THAN SHROPSHIRE.

Tup above one shear
Shearling Tup.
Ewes above one shear.
Shearling Ewes or Gimmers.

Sheep not included in the above Classes must be entered as Extra Stock.

SWINE.

Pigs to be exhibited in pens of three.

LARGE BREED.

Boar.
Sow.
Pigs not above 8 months old.

BLACK OR BERKSHIRE.

Boar.
Sow.
Pigs not above 8 months old.

SMALL BRED.

Boar.
Sow.
Pigs not above 8 months old.

POULTRY.

To be shown in Pens of One Cock or Cockerel and One Hen or Pullet of each of the following breeds :—

Dorking—Silver-Grey.
Dorking—coloured.
Cochin-China.
Bramahpootra.
Spanish.
Scotch Grey.
Hamburg.
Any other pure Breed.
Game—Black or Brown Reds.
Game—Any other pure Breed.
Bantams—Any pure Breed.
Ducks—White Aylesbury.
Ducks—Rouen.
Ducks—Any other pure Breed.
Turkeys—Any pure Breed.
Geese—Any pure Breed.

IMPLEMENTS.

Special Premiums will be offered for the following machines :—

1. For the most efficient and economical implement, to be drawn by horses, for the autumn cultivation of stubbles, on strong turnip land, by ploughing, digging, stirring, or in any other way thoroughly moving the soil, and which leaves it in Spring in the most suitable state of preparation for the ensuing turnip crop. To be judged both at the time when the work is performed in autumn, and also in the following March or April, before the land is again touched.

2. For the most efficient and economical implement, or combination of implements, for the Spring cultivation of land, intended for a green crop, and for bringing to the surface, and leaving loosely thereon, of any root or other weeds; special regard being also had to the freedom of the land so cultivated from trampling by the horses employed in drawing the implements.

HIGHLAND INDUSTRIES AND FISHERIES.

Prizes will be given for Cured Fish and Fish Products, of which due intimation will be given.

BEE HUSBANDRY.

Two Silver Medals will be granted to the Caledonian Apiarian and Entomological Society.

MEMBERS ADMITTED SINCE THE LIST WAS PUBLISHED IN APRIL 1883.

20th June 1883.

BREADALBANE, The Earl of, Taymouth Castle, Aberfeldy
ROLLO, The Hon. The Master of, Duncrub Park, Dunning
SCOTT, Hon. J. C. Maxwell, of Abbotsford, Melrose

Allan, Gavin, Whiteleehill, High Hapton, Newmilns
Anderson, David A., of St Fink and Burnside, Blairgowrie
Anderson, J. M., S.S.C., 9 York Place, Edinburgh
Anderson, Thomas A., Nonikiln, Alness
Aveling, Thomas Lake (Aveling & Porter), Rochester

Baillie, Major-Gen. Duncan, Lochloy, Nairn
Barr, Hugh, Fearnoch, Tighnabruaich
Bartholomew, John, Duntarvie, Winchburgh
Baxter, David, Dovecot, Noblehouse
Bertram, Hugh, Estate Manager, Newbyth, Prestonkirk
Black, James, Tullybreak, Markinch
Black, Robert, C.E., Inverness
Blackett, J. S., Factor, Raith, Kirkcaldy
Boden, William Francis, Scotsburn, Delny
Bonallo, William C., Land Steward, Dalzell, Motherwell
Brodie, Caithness, The Druim, Nairn
Brown, Malcolm, Ugston, Haddington
Brown, P. Stuart, Dares Cottage, Inverness

Cameron, Archibald, Killen, Avoch
Campbell, George James, Solicitor, Inverness
Cheape, Captain George C., yr. of Wellfield, Strathmiglo
Clarke, Lieut.-Col. Montague A., Achereidh, Nairn
Cleghorn, Thomas, Craigour, Liberton
Constable, G. W., Glencraig, Lochgelly
Cox, William, of Snaigow, Dunkeld
Cran, John, Butcher, Keith
Cranston, Robert, Pathhead, Cockburnspath
Crawford, Thomas, Dumawhance, Crieff
Croil, Thomas, Drumwhindle Mains, Ellon
Cross, Adam P., 102 West Bow, Edinburgh
Cunningham, St Clair, 102 West Bow, Edinburgh
Cunningham, Thomas D., The Mount, Cupar Fife

Darling, James, Priestlaw, Garvald
Dewar, John R, U., V.S., Kintore
Dick, W. G. (Macrae & Dick, Horse Hirers), Inverness
Donaldson, Harry Tulloch, Banker, Nairn
Dunbar, James, Writer, 191 West George Street, Glasgow
Duncan, John, Balkemback, Tealing, Dundee
Duncan, John, Kirkmay, Crail
Duncan, Robert, Banff

Fleming, William, Fulwood Mains, Linwood
Forbes, Donald, Essich, Inverness
Fraser, Roderick, Contractor, Inverness

Gallie, Chas. Robertson, Balifeary, Inverness
Geekie, Alexander, Downie Mill, Newbigging, Dundee
Gemmell, William, Braidwood, Gorebridge
Gow, Andrew, Factor, Cranston-Riddel, Dalkeith
Grant, John Macpherson, yr. of Ballindalloch
Grant, R. W. E., of Kincorth, Forres
Greig, John, of Tillyrie, Milnathort
Gunn, John, The Hermitage, Golspie

Hain, James, Tontine Hotel, Cupar Fife
Hamilton, John, Little Cantray, Fort-George Station
Hamilton, William, High Motherwell, Motherwell
Hayward, Charles P., Beaumont Manor, Lincoln
Hebden, Alfred Charles, Factor, Cawdor, Nairn
Henderson, Captain J. H., Rosebank, Wick
Henderson, David Patrick, yr. of Stemster, Thurso
Henderson, James, Culcairn, Invergordon
Honeyman, A. P., Writer, Kirkcaldy
Howe, Thomas, Parks of Inches, Inverness

Inch, Adam, South House, Liberton
Inglis, John Kennedy, Coachbuilder, Kelso
Irving, David Jardine Bell, yr. of Whitehill, Dunnabie, Lockerbie

Jones, Richard Everard, Glenmoidart, Salen, Loch Sunart

Kemp, James, Lime Works, Keith
Kenyon, James William, Oxly Woodhouse, Fartown, Huddersfield

Leonard, John, Farmton, Alford
Linton, John, Mains of Aberarder, Inverness
Lumsden, James Wilson Montgomerie, 30 Drumsheugh Gardens, Edinburgh

M'Auslan, Peter, Letrualt, Row
Macbean, W., Cradle Hall, Inverness
M'Donald, Alexander, Ballintore, Bogroy, Inverness
M'Donald, Alexander (M'Donald Brothers), Portsoy
M'Donald, Charles, Knocknageal, Inverness
MacDonald, Kenneth, Solicitor, Inverness
M'Donald, Wm., Castle Stewart, Inverness
M'Gillewie, R., Balnadrum, Pitlochry
MacGillivray, N. J., of Dunmaglass, Inverness
M'Intyre, William, Dalnavie, Alness

MacKillican, Pryce, Achagour, Nairn
Mackintosh, Hugh, Ironmonger and Implement Maker, Inverness
Mackintosh, James, 3 High Street, Inverness
Maclean, Roderick, Factor, Ardross, Alness
MacLennan, Angus, Factor, Askernish, South Uist, Lochmaddy
M'Leod, James Morrison, Implement Maker, Harcourt Street, Newark
MacNab, John, Distiller, Glenmavis, Bathgate
Macpherson, Charles Edward Walker, C.A., 28 St Andrew Square, Edinburgh
Macqueen, A. Tulloch, Coulmore, Inverness
M'Robbie, Alexander, Sunnyside, Aberdeen
Mactavish, Alexander, Ironmonger and Implement Maker, Inverness
Marr, Alexander, Dalcross, Inverness
Marr, William S., jun,, Upper Mill, Tarves
Mavor, William, Easterton, Elgin
Merry, Archibald W., of Belladrum, Beauly
Merry, Charles J., Belladrum, Beauly
Mitchell, Alexander, Finmouth, Kinglassie
Moffat, William, Craick, Hawick
Mollison, James, jun., Factor, Kirkton, Glenelg
Morrison, John, Carse of Trowan, Crieff
Mungle, John, West Calder
Munro, Charles, Union Bank, Aberfeldy
Murray, David, Moore Park, Cardross
Murray, William, Bellfield, Inverness

Nairn, Michael Barker, of Rankeillour, Cupar Fife

Petrie, George, Pitairlie, Elgin
Pottie, Alexander, V.S., Paisley

Quibell, W. Oliver, Highfield House, Newark-on-Trent

Rae, William, Newmore, Invergordon
Reid, Robert C., C.E., 72 George Street, Edinburgh
Rhind, John, Architect, Inverness
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Roberts, William, Kingussie
Robertson, William, Potato Merchant, Perth
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Ross, William, Brecknish, Inverness
Russell, Alexander, Myreside, Elgin

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Wilson, James, Dykebar, Paisley
Wilson, John, Erskine, Bishopton
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Wood, D., Blairmore Farm, Blairmore

Young, Robert C., Netherfield, Paisley

16*th January* 1884.

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BAILLIE, Hon. Wallace Cochrane, Lamington House
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Anderson, David, Woodhill, Carnoustie
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Greig, William, Ashentilly, Durris, Aberdeen

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Kerr, Hugh, 1 Erskine Place, Edinburgh

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Paterson, William, Windyknowe, Galashiels
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Ross, John M., East Plean House, Bannockburn

Sanderson, James, 41 Manor Place, Edinburgh
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Smith, T. V., of Ardtornish, Oban
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Soutar, John, Cairndrum, Brechin
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Steuart, James H., Selms, Kirknewton
Stewart, James Raphael, 10 Salisbury Road, Edinburgh
Storry, Rev. Alexander, The Manse, Carmunnock

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Thorburn, David, Brockhouse, Stow
Todd, Andrew, 145 St Vincent Street, Glasgow
Todd, John, Tinwald Shaws, Dumfries

Walker, David, Coullie, Udny, Aberdeenshire
Wardlaw, James L., Middlebank, Inverkeithing
Watson, Robert, Culterallers, Biggar
Wauchope, Captain A. S., of Niddrie Marischall, Liberton
Weighton, Jas. G., Priorletham, St Andrews
Wight, Robert, Eskbank, Dalkeith
Wilkie, Captain William, of Ormiston, Kirknewton
Wilson, A. Stephen, North Kinmundy, Summerhill, Aberdeen

DIPLOMA HOLDERS—ELECTED FREE LIFE MEMBERS, 20TH JUNE 1883.

Bardgett, John, Sockbridge Mill, Tirrel, Penrith
Basu, Giris Chandra, Baroogram, Calcutta
Hamilton, Herbert Wm., Boghall, Kingsbarns
Tiffen, John Henry, 4 Grosvenor Terrace, Hull
Watson, Henry Angus, United Presbyterian Manse, Forres

Number of Members in List published in March 1883, . . .	4910
Number of Members admitted in June 1883, ...	155
Number of Members admitted in January 1884, ...	107
Number of Holders of Agricultural Diploma admitted Free Life Members in June 1883, ...	5
	5177
Deduct estimated deaths, &c., ...	147
Total, ...	5030

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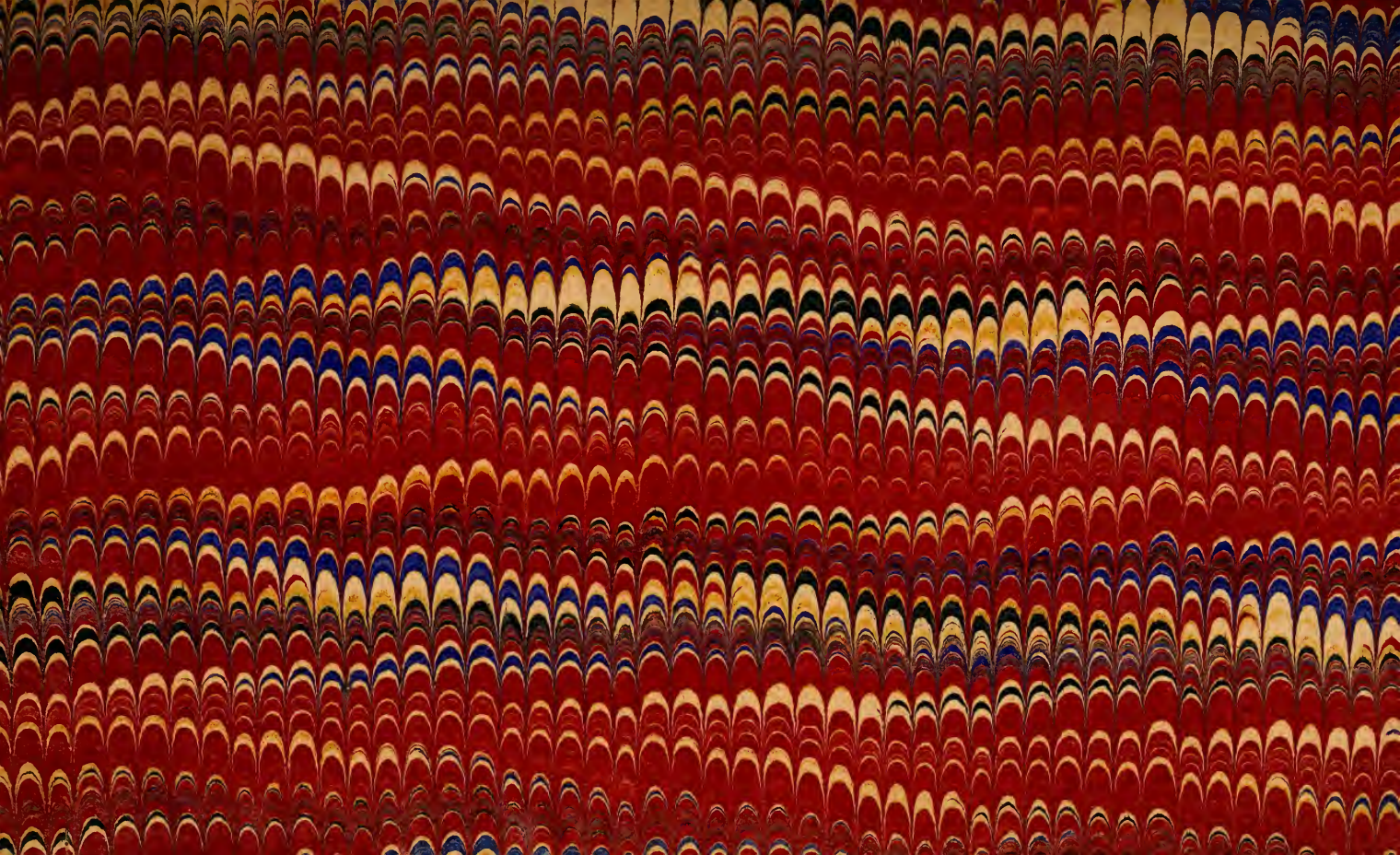

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